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<p>(54) Title: SPACE EFFICIENT DISPLAY DEVICE OR MONITOR</p> <p>(57) Abstract</p> <p>A space efficient display device or monitor coupled to a main computer component(s) (22) that is flexibly positionable between a usable position and a storage/move-away position. A first embodiment space efficient monitor or display device (10) is hingedly coupled via a first embodiment hinge coupling component to another computer component (20) wherein the space efficient monitors or display devices (10) are hingedly movable or swingable between closed, storage positions and open, usable positions. A second embodiment space efficient monitor or display device (10) is coupled to, positioned near or weight supported by another computer component via a second embodiment slide and swing coupling assembly wherein the space efficient monitor or display device (10) is movable between a closed, storage position and an open, usable position. A third embodiment another fold-down/fold-up display device (10) is also provided.</p>			
<pre> graph LR DS[Display Source] --> MD[Main Display Device] MD --- SD1[Space Efficient Display Device] MD --- SD2[Space Efficient Display Device] MD --- SD3[Space Efficient Display Device] </pre>			

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SPACE EFFICIENT DISPLAY DEVICE OR MONITOR

TECHNICAL FIELD

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The present invention relates to a space efficient display device or monitor, and, more particularly, relates to a space efficient display device usable with electronic apparatus including at least one main component and having a 10 main display or monitor, such as main computer components including a main computer monitor and/or a main computer.

BACKGROUND ART

15 There exists in the prior art multiple monitors or display devices coupled to a generally single display source for providing multiple image/data displays and providing additional display area. In fact, Microsoft Corporation's Windows™ 98 provides software support for multiple monitors 20 or displays. The Windows™ 98 software allows the monitors to be controlled by the control panel monitors applet. The monitors are able to be set left or right of each other, and the mouse is moved or windows are dragged among the multiple monitors.

25 Examples of multiple monitors, multiple display devices, or multiple display screens are disclosed in the following prior art patents: U.S. Patent Nos. 5,467,102 to Kuno et al. ("Kuno"); 5,523,769 to Lauer et al. ("Lauer"); 5,537,127 to Jingu ("Jingu"); 5,537,127 to Jingu ("Jingu"); 30 3,909,525 to Fagan; 4,884,068 to Metheny ("Metheny"); 4,922,448 to Kunieda et al. ("Kunieda"); 5,047,754 to Akatsuka et al. ("Akatsuka"); 5,300,943 to Jakobs et al. ("Jakobs"). These prior art patents are herein incorporated by reference.

35 Examples of folding screens or display devices are disclosed in the following prior art patents: U.S. Patent

Nos. 5,128,662 to Failla ("Failla") and 4,542,903 to Yokoi et al.. These prior art patents are herein incorporated by reference.

The main problem with multiple monitors or display devices is that they occupy a fairly large amount of desk space or table space, and they may be difficult or cumbersome to position or move out of the way when they are not being used and moved into position when they are to be used.

Therefore, there is the need and desire to develop space efficient monitors that are usable with electronic apparatus including at least one main component and having a main display or monitor and more specifically to develop space efficient monitors that are usable with main computer components such as a main computer monitor and/or a main computer and that are also flexibly positionable, that is, easily and conveniently positioned to be used when needed or desired and to be easily moved out of the way when not needed or desired.

Accordingly, it is an object and advantage of the present invention to provide at least one space-efficient display device or monitor coupled to an electronic apparatus including at least one main component and having a main display or monitor wherein the at least one space-efficient display device or monitor is flexibly positionable between a usable position and a storage/move-away position.

An aspect and advantage of the present invention is to provide multiple space-efficient display devices or monitors coupled to electronic apparatus including at least one main component and having a main display or monitor wherein each space-efficient display device or monitor is flexibly positionable between a usable position and a storage/move-away A further aspect and advantage of the present invention is to provide at least one space-efficient display device or monitor coupled to a main monitor device.

A still further aspect and advantage of the present invention is to provide at least one space-efficient display device or monitor coupled to a main computer device.

Another object and advantage of the present invention
5 is to provide a first embodiment space-efficient monitor or display device hingedly coupled to a conventional Cathode Ray Tube (CRT) monitor or a flat or Liquid Crystal Display (LCD) monitor or a laptop/notebook Liquid Crystal Display (LCD) computer monitor or a desktop or laptop/notebook
10 computer or any other electronic device or computer component wherein the space-efficient monitors or display devices are hingedly movable or swing between closed, storage positions and open, usable positions.

An aspect and advantage of the present invention is to
15 provide a first embodiment hinge coupling component for hingedly coupling the first embodiment space-efficient monitor or display device to an electronic apparatus component.

Another object and advantage of the present invention
20 is to provide a second embodiment space-efficient monitor or display device coupled to, positioned near, or weight supported by a conventional Cathode Ray Tube (CRT) monitor or a flat or Liquid Crystal Display (LCD) monitor or a desktop computer or any other electronic apparatus or
25 computer component wherein the space-efficient monitor or display device is movable between a closed, storage position and an open, usable position.

An aspect and advantage of the present invention is to provide a second embodiment slide and swing coupling assembly for coupling the second embodiment space-efficient display device and monitor to other computer components.
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Another aspect and advantage of the present invention is to provide the second embodiment slide and swing coupling assembly generally with a sliding support plate, a sliding support rest, a slide engaging/swinging track or groove, and
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a slide engaging/swinging component that engages and slides along the track or groove wherein the slide and swing coupling assembly allows the second embodiment space-efficient display device or monitor to be moved between the 5 closed, storage position and the open, usable position.

A further aspect and advantage of the present invention is to provide a pitch adjustment mechanism for allowing the second embodiment space-efficient display device or monitor to be adjusted between an upward pitch position and a 10 downward pitch position.

A still further aspect and advantage of the present invention is to provide a height adjustment mechanism for allowing the second embodiment space-efficient display device or monitor to be adjusted between a high height 15 position and a low height position.

Another object and advantage of the present invention is to provide a third embodiment fold-down display device coupled to the computer monitor which is folded down to a usable position and folded up to a storage/move-away 20 position.

A further object and advantage of the present invention is to provide various or known ways of coupling the power, signal, and speaker to the present invention space-efficient display devices or monitors.

An aspect and advantage of the present invention is to 25 provide a monitor that is adapted to receive the present invention space-efficient display device(s) or monitor(s) wherein the monitor has respective mounting areas for receiving the present invention space-efficient display 30 device(s) or monitor(s) and further has ports to provide signals and power to the respective space-efficient display device(s) or monitor(s).

Another object and advantage of the present invention is to provide a locking mechanism for locking the space- 35 efficient display devices or monitors to each other and to

electronic apparatus such as the main display or other components.

DISCLOSURE OF THE INVENTION

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Briefly, to achieve the desired objects, advantages and aspects of the instant invention in accordance with a preferred embodiment thereof, provided is a space efficient display apparatus including electronic apparatus with at least one main component and having a main display or monitor and at least one space efficient monitor coupled to the component and moveable between a usable position and a storage position. The one or more space efficient monitors are electrically coupled to the electronic apparatus for displaying selected data in the usable position.

The desired objects, advantages and aspects of the instant invention are further realized in a space efficient display apparatus including electronic apparatus with at least one main component and having a main display or monitor and a pair of space efficient monitors, one each hingedly coupled to opposite sides of the main display and individually pivotally moveable between a usable position and a storage position. The pair of space efficient monitors are electrically coupled to the electronic apparatus for displaying selected data in the usable position.

The desired objects, advantages and aspects of the instant invention are further realized in a space efficient display apparatus including electronic apparatus with at least one main component and having a main display or monitor and at least one space efficient monitor detachably coupled to one side of the main display and moveable between a usable position adjacent the main display and a storage position. The at least one space efficient monitor is

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electrically coupled to the electronic apparatus for displaying selected data in the usable position.

The desired objects, advantages and aspects of the instant invention are further realized in a space efficient display apparatus including electronic apparatus with at least one main component and having a main display or monitor and a pair of space efficient monitors, one each detachably coupled to opposite sides of the main display and individually moveable between a usable position adjacent the main display and a storage position. The pair of space efficient monitors are electrically coupled to the electronic apparatus for displaying selected data in the usable position.

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BRIEF DESCRIPTION OF THE DRAWINGS

The foregoing and further and more specific objects, advantages and aspects of the instant invention will become readily apparent to those skilled in the art from the following detailed description of a preferred embodiment thereof taken in conjunction with the drawings, in which:

FIG. 1 - Block diagram of a general configuration of the present invention space-efficient display device or monitor shown in a usable position coupled to a main computer component(s).

FIG. 2 - Block diagram of a general configuration of the present invention space-efficient display device or monitor shown in a move-away/storage position coupled to a main computer component(s).

FIG. 3 - Block diagram of a general configuration of two present invention space-efficient display devices or monitors shown in usable positions wherein each display device or monitor is coupled to a main computer component(s).

FIG. 4 - Block diagram of a general configuration of two present invention space-efficient display devices or monitors wherein one of the display devices or monitors is in a usable position and the other display device or monitor 5 is in a move-away/storage position wherein each display device or monitor is coupled to a main computer component(s).

FIG. 5 - Block diagram of two present invention space-efficient display devices or monitors shown in move-away/storage position wherein each display device or monitor 10 is coupled to a main computer component(s).

FIG. 6 - Block diagram of multiple present invention space-efficient display devices or monitors that are coupled to a main display device and a display source.

15 FIG. 7 - Perspective view of a first embodiment of the present invention space-efficient monitors or display devices hingedly coupled to a conventional Cathode Ray Tube (CRT) computer monitor wherein the space-efficient monitors or display devices are in the closed, storage position.

20 FIG. 8 - Perspective view of the first embodiment of the present invention space-efficient monitors or display devices hingedly coupled to a conventional CRT computer monitor wherein the space efficient monitors or display devices are in the open, usable position.

25 FIG. 9 - Top view of the monitors or display devices of FIG. 7.

FIG. 10 - Side view of the monitors or display devices of FIG. 7.

30 FIG. 11 - Back perspective view of a CRT monitor adapted to receive the present invention space-efficient display devices or monitors.

35 FIG. 12 - Close-up detailed view of the ports at the back of the CRT monitor adapted to receive the present invention space-efficient display devices or monitors wherein the view is defined by the circle A of FIG. 11.

FIG. 13 - Front perspective view of the CRT monitor of FIG. 11 showing two space-efficient display devices or monitors hingedly coupled to the CRT monitor.

5 FIG. 14A - Front perspective view of the CRT monitor of FIG. 11 showing the mechanisms for hingedly coupling the space-efficient display devices or monitors to the CRT monitor.

10 FIG. 14B - Back perspective view of the CRT monitor of FIG. 11 showing the mechanisms for hingedly coupling the space-efficient display devices or monitors to the CRT monitor.

FIG. 15 - Exploded view of the components and mechanisms for hingedly coupling the space-efficient display devices or monitors to the CRT monitor of FIG. 11.

15 FIG. 16 - Perspective view of the first embodiment of the present invention space-efficient monitors or display devices coupled to a flat or Liquid Crystal Display (LCD) computer monitor wherein the space-efficient monitors or display devices are in the storage position and a third embodiment fold-down display device is also coupled to the LCD computer monitor.

20 FIG. 17 - Perspective view of the first embodiment of the present invention space-efficient monitors or display devices of FIG. 16 wherein the space-efficient monitors or display devices are shown in the usable position and the fold-down display device is shown in the storage position.

30 FIG. 18 - Perspective view of the first embodiment space-efficient monitors or display devices of FIG. 16 wherein the space-efficient monitors or display device are in the usable position and the fold-down display device is shown in the usable position.

FIG. 19 - Close up view of the display controls of FIG. 18 defined by the circle A.

35 FIG. 20 - Perspective view of the first embodiment of the present invention space-efficient monitors or display

devices coupled to a laptop/notebook Liquid Crystal Display (LCD) computer monitor wherein the space-efficient monitors or display devices are in the storage position and the LCD computer monitor is in the open position.

5 FIG. 21 - Perspective view of the first embodiment space-efficient monitors or display devices coupled to a laptop/notebook Liquid Crystal Display (LCD) computer monitor wherein the space-efficient monitors or display devices are in the usable position and the LCD computer monitor is in the open position.
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FIG. 22 - Perspective view of the first embodiment present invention space-efficient monitors or display devices coupled to a laptop/notebook Liquid Crystal Display (LCD) computer monitor wherein the space-efficient monitors or display devices are in the storage position and the LCD computer monitor is in the closed position.
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FIG. 23 - Top view of the first embodiment space-efficient monitors or display devices and laptop/notebook Liquid Crystal Display (LCD) computer monitor of FIG. 22.

20 FIG. 24 - Front view of the first embodiment space-efficient monitors or display devices and laptop/notebook Liquid Crystal Display (LCD) computer monitor of FIG. 22.

FIG. 25 - Side view of the first embodiment space-efficient monitors or display devices and laptop/notebook
25 Liquid Crystal Display (LCD) computer monitor of FIG. 22.

FIG. 26 - Perspective view of a second embodiment of the present invention space-efficient monitor or display device wherein the space-efficient monitor or display device is coupled to a CRT monitor and is in the storage position.
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FIG. 27 - Perspective view of the second embodiment space-efficient monitor or display device of FIG. 26 sliding between the storage position and the usable position.

FIG. 28 - Perspective view of the second embodiment space-efficient monitor or display device of FIG. 26 wherein

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the space-efficient monitor or display device is in the usable position.

FIG. 29 - Side view of the second embodiment space-efficient monitor or display device of FIG. 26 wherein the 5 space-efficient monitor or display device is shown to be able to adjust in pitch to an upward position.

FIG. 30 - Side view of the second embodiment space-efficient monitor or display device of FIG. 26 wherein the 10 space-efficient monitor or display device is shown to be able to adjust in pitch to a downward position.

FIG. 31 - Side view of the second embodiment space-efficient monitor or display device of FIG. 26 wherein the space-efficient monitor or display device is shown to be able to adjust in height to a low position.

15 FIG. 32 - Side view of the second embodiment space-efficient monitor or display device of FIG. 26 wherein the space-efficient monitor or display device is shown to be able to adjust in height to a high position.

20 FIG. 33 - Perspective view of the second embodiment space-efficient monitor or display device that has a base for being weight stand supported by and/or coupled underneath another computer component(s) wherein the monitor or display device is in the storage position.

25 FIG. 34 - Perspective view of the second embodiment space-efficient monitor or display device of FIG. 33 wherein the monitor or display device is sliding between the storage position and the usable position.

30 FIG. 35 - Perspective view of the second embodiment space-efficient monitor or display device of FIG. 33 wherein the monitor or display device is in the usable position.

FIG. 36 - Perspective view of the second embodiment space-efficient monitor or display device of FIG. 33 wherein the monitor or display device is in the usable position and further showing details of the height adjustment mechanism.

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FIG. 37 - Perspective view of the second embodiment space-efficient monitor or display device wherein the monitor or display device is in the usable position and further showing details of the sliding mechanism and the 5 pitch adjustment mechanism.

FIG. 38 - Close up view of the height adjustment mechanism for the second embodiment monitor or display device of FIG. 36 defined by the circle A.

10 FIG. 39 - Close up view of the pitch adjustment mechanism for the second embodiment monitor or display device of FIG. 33 defined by the circle B.

FIG. 40 - Close up view of the sliding mechanism for the second embodiment monitor or display device of FIG. 33 defined by the circle A.

15 FIG. 41 - Side view of the second embodiment space-efficient monitor or display device wherein the monitor or display device is in an upward tilted pitch position.

20 FIG. 42 - Side view of the second embodiment space-efficient monitor or display device wherein the monitor or display device is in a downward tilted pitch position.

FIG. 43 - Side view of the second embodiment space-efficient monitor or display device wherein the monitor or display device is in a high height position.

25 FIG. 44 - Side view of the second embodiment space-efficient monitor or display device wherein the monitor or display device is in a low height position.

30 FIG. 45 - Perspective view of the second embodiment of the present invention space-efficient monitor or display device coupled to a tower computer wherein the space-efficient monitor or display device is in the storage position.

35 FIG. 46 - Perspective view of the second embodiment of the present invention space-efficient monitor or display device of FIG. 45 sliding between the storage position and the usable position.

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FIG. 47 - Perspective view of the second embodiment of the present invention space-efficient monitor or display device of FIG. 45 wherein the space-efficient monitor or display device is in the usable position.

5 FIG. 48 - Perspective view of the second embodiment space-efficient monitor or display device showing the power input receptacle, signal input receptacle, and speaker receiving groove.

10 FIG. 49 - Perspective front view of the locking mechanism and engaged key for locking a pair of space-efficient monitors or display devices to a main computer monitor.

15 FIG. 50 - Perspective view of a lock engaging slot in one of the space-efficient monitor or display device and a lock engaging slot in the main computer monitor wherein the lock engages into these lock engaging slots.

FIG. 51 - Back perspective view of the locking mechanism and unpushed/disengaged key mounted in a present invention space-efficient monitor or display device.

20 FIG. 52 - Back perspective view of the locking mechanism and pushed/disengaged key mounted in a present invention space-efficient monitor or display device.

25 FIG. 53 - Back perspective view of the locking mechanism and pushed/engaged key mounted in a present invention space-efficient monitor or display device.

BEST MODES FOR CARRYING OUT THE INVENTION

Turning now to the drawings in which like reference characters indicate corresponding elements throughout the several views, attention is first directed to FIG. 1 which illustrates at least one space-efficient display device or monitor 10 usable in conjunction with electronic apparatus including at least one main component and having a main display or monitor. The electronic apparatus utilized for

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purposes of explanation in this disclosure is a computer with at least one computer component 25 but it should be understood that virtually any electronic apparatus including a display could be incorporated. For example, the space-efficient display device(s) or monitor(s) 10 of the present invention can be utilized with electronic apparatus including but are not limited to one of the following forms: a main computer monitor, touch screen display, television unit, or any other suitable display unit or other component coupled to a display source to display images and information. The space-efficient display device or monitor 10 is easily and conveniently moved to a usable position when a user needs or desires to use the display device or monitor 10 and is easily moved to a storage position, a move-away position, intermediate position, or any other desired position when the user desires or needs not to use the display device or monitor 10 or desires to have the display device or monitor 10 moved out of the way relative to the other computer component(s) 25 that the user may be operating. Thus, the display device or monitor 10 is termed or defined as a "space-efficient" display device or monitor since the display device or monitor 10 is designed to occupy less space than conventional or prior art display device or monitors and is flexibly positionable relative to the other computer component(s) 25, that is, the display device or monitor 10 is placed in a usable position when the user desires or needs to operate the display device or monitor 10 and at least stored or moved out of the way relative to the other computer component(s) 25 to which the display device or monitor 10 is coupled when the user desires or needs not to operate the display device or monitor 10.

I. Overall Concept

Referring generally to FIGS. 1 - 6, the basic overall concept for the present invention is illustrated in the several simplified block diagrams. Turning specifically to FIGS. 1 and 2, a space-efficient display device or monitor 10 is illustrated placed near or coupled to a main/other computer component 25. Computer component 25 may be a main display source 22 (see FIG. 6), or it may be a main display device 20. Space-efficient display device 10 is illustrated by FIG. 1 in a usable position relative to main computer component 25 while FIG. 2 illustrates space-efficient display device 10 in a move-away/storage position relative to the other or main computer component 25. Turning to FIG. 3, two (or multiple) space-efficient display devices 10 are illustrated coupled to a main/other computer component 25 wherein the display devices 10 are in usable positions. Turning additionally to FIGS. 4 and 5, display devices 10 are illustrated as individually moveable between usable positions and move-away/storage positions relative to each other and to main computer component 25.

The main overall concept that the present invention provides is that each space-efficient monitor or display device 10 is placed or moved to a usable position when the user desires to operate that space-efficient monitor or display device 10 and is conveniently placed or moved out of the way when the user desires not to operate it or desires that it be moved out of the way. Space-efficient monitors or display devices 10 do not have to be attached to main computer component 25 so long as each monitor or display device 10 is adjacently or proximately placed or coupled to be able to move relative to main computer component 25. Many configurations exist for the present invention and the present invention is not in any way limited to the configurations, forms, embodiments, monitors, displays,

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screens, computers, computer components, coupling components, weight support components, pitch adjustment mechanisms, height adjustment mechanisms, locking mechanisms presented in this specification, and any and all suitable configurations, forms, systems, apparatuses, methods, hardware, monitors, displays, screens, computers, computer components, coupling components, weight support components, pitch adjustment mechanisms, height adjustment mechanisms, locking mechanisms, and other features may be used to accomplish the overall concept of the present invention.

For example, FIG. 6 shows a block diagram of an example set-up configuration for the present invention. Three (or multiple) space-efficient monitors or display devices 10 are each coupled to a main display device 20 and/or a display source 22. Display source 22 provides display images, display data, or display information to space-efficient display devices 10 and main display device 20. However, space-efficient display devices 10 do not have to be attached or coupled to main display device 20 so long as each space-efficient monitor or display device 10 is adjacently or proximately placed or coupled to be able to move relative to main display device 20 and/or display source 22. The main overall concept that the present invention provides is that each the multiple space-efficient display device 10 is placed or moved to at least a usable position when the user desires to operate that display device 10 and is conveniently placed or moved out of the way when the user desires not to operate it or desires that it be moved out of the way. Therefore, many additional configurations exist for providing the overall concept and the present invention is not in any way limited to the configurations or forms shown and described.

II. Overall Components for the Space-Efficient Monitor or Display Device

Turning now to FIGS. 8 through 10, an embodiment of a space-efficient monitor or display device generally comprises at least one flat screen 170, a housing 180, at least one monitor circuit inside the housing 180, and at least one coupling interface component 15, e.g. coupling interface component 15A or 15B (See FIGS. 8 and 28). Flat screen 170 has a flat viewing surface and a relatively thin width so that it is not too large or bulky to move/carry (i.e. easily moved/transported) and does not occupy as much space as a typical or conventional monitor. An example of a flat screen is a liquid crystal display (LCD) screen. However, the present invention is not limited to a specific screen disclosed in this specification, and any suitable flat screen is able to be used in conjunction with the present invention.

Flat screen 170 is received and held within housing 180, and housing 180 is sized to allow space-efficient monitor or display device 10 to be flexibly positionable, that is, to be movable between a usable position and a storage/move-away position. In this embodiment, housing 180 is a rectangular frame shape that surrounds flat screen 170, but there can be many other shapes and configurations for housing 180. The present invention is not limited to the specific housing 180 disclosed in this specification, and any suitable housing can be used in conjunction with the present invention.

The monitor circuit (not shown) is coupled to flat screen 170, and provides monitor controls and display to each flat screen 170. Furthermore, interface components are attached or coupled to the monitor circuit. The interface component allow space-efficient monitor or display device 10 to be coupled to display source 22. Coupling components 15

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are further coupled to main display device 20 and/or display source 22 so that space-efficient monitor or display device 10 is movable relative to main display device 20 and/or display source 22. Also, there are many different types, 5 configurations, and forms of monitor circuits, interface components, and coupling components 15 to couple/interface with display source 22 and to other display devices 20. However, the present invention is not limited to the specific monitor circuits, interface components, and 10 coupling components 15 disclosed in this specification, and any suitable components or circuits for providing monitor controls and displays and for coupling display device 10 to main display device 20, display source 22, and to other display devices or sources can be used in conjunction with 15 the present invention.

As further examples, first, second, and third embodiments of the present invention are disclosed in this specification.

20 III. First Embodiment Space-Efficient Monitor or Display Device Hingedly Coupled to a Main Computer Component

25 A. First Embodiment Space-Efficient Monitor or Display Device Hingedly Coupled to CRT Monitor

Referring generally to FIGS. 7 - 25, a first embodiment of the present invention is illustrated in which space-efficient monitors or display devices are hingedly coupled to main computer component 25. Referring specifically to 30 FIGS. 7 - 10, two space-efficient monitors or display devices 10A, are illustrated hingedly coupled to a cathode ray tube (CRT) computer monitor 20A (shown having display controls 26A and a swivel monitor base 28A) in accordance with the present invention. Each of the two space-efficient 35 monitors or display devices 10A is hingedly attached to a

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side of the CRT computer monitor 20A by use of the first embodiment hinge coupling component 15A. The two display devices 10A swing open from and closed towards the CRT computer monitor 20A (i.e. like doors). Display devices 10A are hingedly moved or swung open when the user desires to operate display devices 10A and CRT computer monitor 20A (see FIG. 8). When display devices 10A are moved to the open position, the user has two additional computer monitors to use that are adjacent to CRT computer monitor 20A as shown in FIG. 8. Display devices 10A are hingedly moved or swung closed when the user desires not to operate display devices 10A and CRT computer monitor 20A. The two display devices 10A close (i.e. like doors) to cover the screen of CRT computer monitor 20A as shown in FIGS. 7, 9, and 10.

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B. CRT Monitor Adapted to Receive Hingedly Coupled Space-Efficient Monitor or Display

Referring now to FIGS. 11 - 15, it can be seen that CRT monitor 20A is adapted to receive the first embodiment hingedly coupled space-efficient monitors or display devices 10A. Referring specifically to FIGS. 11 and 12, the back side of CRT monitor 20A is illustrated. CRT monitor 20A is shown to have a power receptacle 96 for attaching CRT monitor 20A to a power source for powering CRT monitor 20A. CRT monitor 20A also has a main monitor port 90 for coupling and receiving the image signals from display source 22 (e.g. from a computer) that are to be displayed on CRT monitor 20A. CRT monitor 20A further has a left monitor port 92 and a right monitor port 94 as best seen in FIG. 12. Referring additionally to FIG. 13, two space-efficient monitors or display devices 10A hingedly coupled to the CRT monitor 20A are illustrated in an enlarged view. Left monitor port 92 couples the image signals from display source 22 to left space-efficient monitor or display 10A and right monitor

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port 94 couples the image signals from display source 22 to right space-efficient monitor or display 10A.

Referring additionally to FIGS. 14A, 14B, and 15, a hinge coupling component 15A is used to hingedly couple the 5 left space-efficient display device 10A to CRT monitor 20A. A hinge coupling base 17 is mounted at each side of CRT monitor 20A to couple respective space-efficient display devices 10A. A power coupling wire 34 couples the power receptacle 96 to a mounting power receiving receptacle 32A, 10 and the receptacle 32A is mounted into an upper mounting port 30 of the CRT monitor 20A. Space-efficient monitor or display device 10A has a coupling component 19P that couples the circuitry and driving components of CRT display device 20A to power these circuits and components via additional 15 power coupling wire 34. Power coupling wire 34 is fed from the coupling component 19P through an upper mounting port 30 of the upper hinge coupling base 30, through an upper hollow hinge support component 35, and through the upper hollow hinge portion 36 of the housing of space-efficient display 20 device 10A. Upper hollow hinge support component 35 supportingly attaches to mounting slots 31 aligned and located in base 17 and at the side of CRT monitor 20A. Upper hinge portion 36 rotates about upper hinge support component 35 to provide the hinge movement for space- 25 efficient display device 10A.

A signal coupling wire (not shown but similar to the power coupling wire 34) couples the left signal receptacle or monitor port 92 to a mounting signal receiving receptacle (not shown but similar to the mounting power receiving 30 receptacle 32A), and the mounting signal receiving receptacle is mounted into a lower mounting port 30. The left space-efficient monitor or display device 10A has a signal coupling component (not shown) that couples the screen of space efficient monitor or display device 10A to 35 provide images thereto. The signal coupling wire is fed

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from the signal coupling component through lower mounting port 30 of hinge coupling base 30, through a hollow hinge support component 35, and through lower hollow hinge portion 36 of the housing of left space-efficient display device 10A. Lower hollow hinge support component 35 supportingly attaches to lower mounting slots 31 aligned and located in base 17 and at the side of CRT monitor 20A. Lower hinge portion 36 rotates about lower hinge support component 35 to provide the hinge movement for space-efficient display device 10A.

Right space-efficient display device 10A is hingedly coupled to CRT monitor 20A in the same manner as left space-efficient display device 10A. Power receptacle 96 is coupled to right space-efficient monitor or display device 10A to provide power to the circuits and screen of both left and right monitor or display devices 10A. Right monitor port 94 couples the image signals from display source 22 to right space-efficient monitor or display 10A. Therefore, left and right space-efficient display devices 10A are electrically and hingedly coupled to CRT monitor 20A. Space-efficient display devices 10A may be hingedly swung to a closed, stored position wherein display devices 10A cover the screen of CRT monitor 20A, and they may be hingedly swung to an open, usable position wherein display devices 10A and CRT monitor 20A are viewable and visible to the user.

However, the present invention is not limited to the specific manners or ways in which these space-efficient display devices or monitors are hingedly coupled to a computer component or as to how the power or signal ports/components are coupled as disclosed in this specification, and any suitable manner or way of how these space-efficient display devices or monitors are hingedly coupled to a computer component or how the power or signal

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ports/components are coupled is able to be used in conjunction with the present invention.

C. First Embodiment Space-Efficient Monitors or Display

5 DevicesHingedly Coupled to LCD Monitor

10 1. First and Third Embodiment Space-Efficient
Monitors or Display Devices Hingedly Coupled to Conventional
LCD Monitor

Referring now to FIGS. 16 - 19, a first embodiment and a third embodiment of the present invention are illustrated, wherein two space-efficient monitors or display devices 10A and a fold-down display device 10C are coupled to a conventional or stand-alone liquid crystal display (LCD) or flat screen computer monitor 20B (shown having display controls 26B and a swivel monitor base 28B). Each of the two space-efficient monitors or display devices 10A is hingedly attached to a side of the LCD computer monitor 20B by a coupling component 15A, such as the first embodiment hinge described above. The two display devices 10A swing open from and closed towards LCD computer monitor 20B (i.e. like doors). Display devices 10A are hingedly moved or swung open when the user desires to operate display devices 10A and LCD computer monitor 20B. When display devices 10A are moved to the open position, the user has two additional computer monitors to use that are adjacent to LCD computer monitor 20B as shown in FIGS. 17 and 18. Display devices 10A are hingedly moved or swung closed when the user desires not to operate display devices 10A and LCD computer monitor 20B. The two display devices 10A close (i.e. like doors) to cover the screen of LCD computer monitor 20B as shown in FIG. 16.

A third embodiment of the present invention is also illustrated in FIGS. 16 - 19, which show a fold-down/fold-

up, space-efficient monitor or display device 10C coupled to the conventional or stand-alone liquid crystal display (LCD) or flat screen computer monitor 20B. Fold-down/fold-up display device 10C is hingedly attached to a bottom side of 5 LCD computer monitor 20B by use of a hinged coupling component 15A, such as the first embodiment hinge described above. A release/locking button 10D releases display device 10C, and display device 10C swings open (i.e. folds down) to the usable position. Display device 10C also swings closed 10 (i.e. folds up) to the storage/move-away position, and release/locking button 10D locks it to the fold up position. Fold-down display device 10C may be used as a computer monitor or for other applications, including but not limited 15 to a screen with programmed icons, menus, macros, etc.; a touch screen; a programmable keyboard or keypad; a numeric pad; a calculator pad; or a screen or pad for various computer controls.

As shown in FIG. 16, a locking mechanism 80 is located in one of display devices 10A so that it locks display 20 devices 10A to each other and to LCD computer monitor 20B. The details of this locking mechanism 80 will be discussed later in this specification (i.e. see FIGS. 49 - 53). Furthermore, display devices 10A are each shown with a speaker 40 coupled to each display device 10A by sliding and 25 engaging them into the speaker engaging groove 43 (see FIG. 48) and locking them to the display device 10A via speaker lock 42.

2. First Embodiment Space-Efficient Monitors or
30 Display Devices Hingedly Coupled to Laptop/Notebook Computer
LCD or Flat Screen Monitor

Referring generally to FIGS. 20 - 25, two space-efficient monitors or display devices 10A coupled to the LCD 35 or flat screen monitor 20B of a laptop/notebook computer 22B

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and to laptop/notebook computer 22B. Each of the two space-efficient monitors or display devices 10A is hingedly attached to a side of the laptop/notebook computer monitor 20B by use of a hinge coupling component 15A, which may be 5 similar to the hinge component described in detail above. The two display devices 10A swing open from and closed towards laptop/notebook computer monitor 20B (i.e. like doors). Display devices 10A are hingedly moved or swung open when the user desires to operate the display devices 10A and laptop/notebook computer monitor 20B. When display devices 10A are moved to the open position, the user has two additional computer monitors to use that are adjacent to laptop/notebook computer monitor 20B, as shown in FIG. 21.

Display devices 10A are hingedly moved or swung closed 15 when the user desires not to use display devices 10A and laptop/notebook computer monitor 20B. The two display devices 10A close (i.e. like doors) to cover the screen of laptop/notebook computer monitor 20B, as shown in FIG. 20. When display devices 10A are hingedly moved to the closed 20 position, display devices 10A are sufficiently thin and laptop/notebook computer monitor 20B is hingedly attached to laptop/notebook computer 22B so that computer monitor 20B with display devices 10A in the closed position may then be hingedly moved to a closed packed storage position, as shown 25 in FIGS. 22 - 25. Laptop/notebook computer monitor 20B and space-efficient monitors or display devices 10A in the closed position are swung closed generally over the keyboard of laptop/notebook computer 22B. Laptop/notebook computer 22B in this closed packed storage position may then be 30 transported or stored away by the user.

IV. Second Embodiment Space-Efficient Monitors or Display Devices

5 A. Second Embodiment Space-Efficient Monitors or Display Devices Coupled to CRT Monitor

Referring generally to FIGS. 26 - 30, a second embodiment of the present invention is illustrated wherein a space-efficient monitor or display device 10B is coupled to a conventional cathode ray tube (CRT) computer monitor 20A (shown having display controls 26A and a swivel monitor base 28A). Space-efficient monitor or display device 10B in FIGS. 26 - 28 has a speaker 40 coupled thereto via speaker groove 43 (see FIG. 48) and speaker lock 42. Alternatively, 15 space-efficient monitor or display device 10B in FIGS. 29 - 30 has a speaker groove cover 45 mounted in the speaker groove 43 (see FIG. 48) if a speaker is not mounted thereto.

Space-efficient monitor or display device 10B is coupled to a side of CRT computer monitor 20A by use of a 20 slide and swing coupling assembly 15B. Slide and swing coupling assembly 15B generally comprises a sliding support plate 12, a pitch adjustment housing 13 (see FIGS. 36 - 44), a sliding support rest 14, a slide engaging/swinging track or groove 65, and a slide engaging/swinging component 60 25 that engages and slides along track or groove 65. Slide and swing coupling assembly 15B is mounted to the side of CRT computer monitor 20A as shown in FIGS. 26 - 30. Referring specifically to FIG. 26, display device 10B is positioned so that a screen 170 of display device 10B faces 30 support plate 12 and so that a side 11A of display device 10B contacts and/or rests at or near sliding support rest 14, and display device 10B is stored and/or moved to the side of CRT computer monitor 20A.

Referring specifically to FIG. 27, the user slides 35 display device 10B from a storage position adjacent support

plate 12 and support rest 14 to an intermediate position in which screen 170 of display device 10B and the screen side of CRT computer monitor 20A generally forms a right angle. Display device 10B is slidably guided from slide and swing coupling assembly 15B by slide engaging/swinging component 60 (i.e. may be button engaged/disengaged) engaging and sliding along slide engaging/swinging groove or track 65. Referring additionally to FIG. 28 it can be seen that slide engaging/swinging groove or track 65 is located along a top side 11B of support plate 12, and slide engaging/swinging component 60 is located at a top edge of CRT computer monitor 20A. However, another slide engaging/swinging groove or track 65 may be located along a bottom side 11C of support plate 12, and a slide engaging/swinging component (not shown) will be located at a bottom edge of display device 10B and CRT computer monitor 20A.

After display device 10B is pulled and slid out, side 11A of display device 10B is at or near the edge of computer monitor 20A. Referring specifically to Fig 28, it can be seen that display device 10B is pivoted about the axis (i.e. an axis along the side 11A) of slide engaging/swinging component 60 (i.e. slide engaging/swinging component 60 has a hinged or pivotable component) so that display device 10B swings to an open and usable position for the user. If the user desires not to use and move/store away display device 10B, then the user simply swings, pivots, or rotates display device 10B so that it is generally parallel to support plate 12, and display device 10B is slid back into the storage position by sliding slide engaging/swinging component 60 along track or groove 65. Display device 10B is slid back into the position where side 11A is at or near sliding support rest 14 (FIG. 26).

Referring generally to FIGS. 26 - 44, slide and swing coupling assembly 15B is illustrated with a pivot adjustment mechanism 70 to adjust the pitch of display device 10B. A

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pitch adjustment button 72 (best seen FIGS. 26, 33, and 39) is located at the side of slide and swing coupling assembly 15B. Slide and swing coupling assembly 15B also has a height adjustment mechanism 100 to adjust the height of display device 10B. Height adjustment mechanism 100 generally comprises a height adjustment plate 102 having a number of height adjustment holes 108 along a sliding slot groove, a height adjustment base 104, and a height adjustment knob 106 as shown in the various figures (e.g. see FIGS. 29 - 32). Height adjustment mechanism 100 is mounted or attached to the side of monitor 20B via mounting screws 109. Referring specifically to FIGS. 29 and 30, respectively, it can be seen that display device or monitor 10B may be moved between an upward pitch position and a downward pitch position. Also, FIGS. 31 and 32, respectively, show that display device or monitor 10B may be adjusted in steps between a low height position and high height position.

20 B. Device Having a Base for being Weight Stand Supported by and/or Coupled Underneath Another Computer Component(s).

Now referring generally to FIGS. 33 - 44, another embodiment is illustrated of a space-efficient monitor or display device 10B having a base 110 for allowing monitor or display device 10B to be weight stand supported by and/or coupled underneath another computer component 25, including but not limited to a CRT computer monitor 20A, a LCD computer monitor 20B, a computer 22A, and a laptop/notebook computer 22B. Second embodiment space-efficient monitor or display device 10B has a speaker 40 coupled to it via speaker lock 42. Second embodiment monitor or display device 10B has a weight support base 110 that supports display device 10B in a standing, upright position. Another

device or apparatus is placed on weight support base 110 so that display device 10B stays and is maintained in the upright position. For example, a CRT monitor 20A or a LCD monitor 20B or a computer 22A or a laptop/notebook computer 5 22B is placed on weight support base 110 so that display device 10B stands upright and display device 10B provides a monitor for computer component 25 that is supporting it at base 110.

The weight stand supported space-efficient monitor or 10 display device 10B also incorporates the second embodiment slide and swing weight support coupling assembly 15B. Slide and swing weight support coupling assembly 15B generally comprises a sliding support plate 12, a pitch adjustment housing 13, a sliding support rest 14, a slide 15 engaging/swinging track or groove 65, and a slide engaging/swinging component 60 that engages and slides along track or groove 65. Base 110 is coupled or slid underneath the weight support device or component 25 so that slide and swing weight support coupling assembly 15B is in contact or 20 proximate a side of the weight support device. In FIG. 33, display device 10B is positioned so that the screen side of the display device 10B faces the support plate 12 and so that side 11A of display device 10B contacts and/or rests at or near sliding support rest 14, and display device 10B is 25 stored and/or moved generally to the side of the weight support device.

Referring specifically to FIG. 30, the user slides display device 10B from support plate 12 and support rest 14 so that the screen side of the display device 10B is pulled 30 out from and no longer facing support plate 12. Display device 10B is slidably guided from slide and swing weight support coupling assembly 15B by slide engaging/swinging component 60 engaging and sliding along slide engaging/swinging groove or track 65 (See FIG. 40). FIGS. 35 33 - 44 show that slide engaging/swinging groove or track 65

is located along top side 11B of support plate 12, and slide engaging/swinging component 60 is located at a top edge of display device 10B. However, another slide engaging/swinging groove or track 65 may be located along a bottom side 11C of support plate 12, and a slide engaging/swinging component (not shown) will be located at a bottom edge of display device 10B.

After display device 10B is pulled and slid out, side 11A of display device 10B is at or near the edge of the weight support device or component. Referring specifically to FIGS. 35, 36, and 37, it can be seen that display device 10B is rotated and pivoted about the axis (i.e. an axis along side 11A) of slide engaging/swinging component 60 (i.e. slide engaging/swinging component 60 has a hinged or pivotable component) so that display device 10B swings to an open and usable position for the user. If the user desires not to use and move/store away display device 10B, then the user simply swings, pivots, or rotates display device 10B so that it is generally parallel to support plate 12, and display device 10B is slid back into the storage position by sliding slide engaging/swinging component 60 along track or groove 65. Display device 10B is slid back into the position where side 11A is at or near sliding support rest 14.

Slide and swing coupling assembly 15B has a pivot adjustment mechanism 70 to adjust the pitch of display device 10B. A pitch adjustment knob 72 is located at the side of slide and swing coupling assembly 15B as shown in the various figures (i.e. see FIGS. 33 - 44). Slide and swing weight support coupling assembly 15B also has a height adjustment mechanism 100 to adjust the height of display device 10B. Height adjustment mechanism 100 generally comprises a height adjustment plate 102 having a number of height adjustment holes 108 along a sliding slot groove, a

height adjustment base 104, and a height adjustment knob 106 as shown in the various figures (i.e. see FIGS. 33 - 44).

5 C. Second Embodiment Space-Efficient Monitor
 or Display Device Coupled to Computer

Referring generally to FIGS. 45 - 47, a second embodiment space-efficient monitor or display device 10B is illustrated coupled to a conventional computer 22A (i.e. 10 computer with tower case). Second embodiment monitor or display device 10B has a speaker 40 coupled thereto via speaker lock 42. Space-efficient monitor or display device 10B is coupled to a side of computer 22A by use of second embodiment slide and swing coupling assembly 15B. Slide and 15 swing coupling assembly 15B generally comprises sliding support plate 12, pitch adjustment housing 13, sliding support rest 14, slide engaging/swinging track or groove 65, and slide engaging/swinging component 60 that engages and slides along track or groove 65. Slide and swing coupling 20 assembly 15B is mounted to side of the computer 22A as shown in FIGS. 45 - 47. Referring specifically to FIG. 45, it can be seen that display device 10B is positioned so that screen 170 of display device 10B faces support plate 12 and so that side 11A of display device 10B contacts and/or rests at or 25 near sliding support rest 14, and display device 10B is stored and/or moved to a side of computer 22A.

Referring specifically to FIG. 46, it can be seen that display device 10B is slid from support plate 12 and support rest 14 so that the screen side of display device 10B is 30 pulled out from and no longer facing support plate 12. Display device 10B is slidingly guided from slide and swing coupling assembly 15B by slide engaging/swinging component 60 engaging and sliding along slide engaging/swinging groove or track 65. FIGS. 45 - 47 show that slide 35 engaging/swinging groove or track 65 is located along top

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side 11B of support plate 12, and slide engaging/swinging component 60 is located at a top edge of display device 10B. However, another slide engaging/swinging groove or track 65 may be located along a bottom side 11C of support plate 12, 5 and slide engaging/swinging component 60 (not shown) may be located at a bottom edge of display device 10B.

After display device 10B is pulled and slid out, side 11A of display device 10B is at or near the edge of computer 22A. In FIG. 47, display device 10B is pivoted about the 10 axis (i.e. an axis along side 11A) of slide engaging/swinging component 60 (i.e. slide engaging/swinging component 60 has a hinged or pivotable component) so that display device 10B swings to an open and usable position for the user. If the user desires not to use and move/store 15 away display device 10B, then the user simply swings, pivots, or rotates display device 10B so that it is generally parallel to support plate 12, and display device 10B is slid back into the storage position by sliding slide engaging/swinging component 60 along track or groove 65. 20 Display device 10B is slid back into the position where side 11A is at or near sliding support rest 14.

Slide and swing coupling assembly 15B has a pivot adjustment mechanism 70 to adjust the pitch of display device 10B (i.e. see FIGS. 45 and 47). Slide and swing 25 coupling assembly 15B also has a height adjustment mechanism 100 to adjust the height of display device 10B (i.e. see FIG. 46).

D. Receptacles and Engaging Groove for Second
30 Embodiment Space-Efficient Monitor or Display Device

Second embodiment space-efficient monitor or display device 10B has a power receptacle 190 for coupling a power source to the screen and circuitry of space efficient 35 monitor or display device 10B and has a signal input

receptacle 200 for coupling a signal source to the screen of space efficient monitor or display device 10B for providing image information and data thereto. Furthermore, space-efficient monitor or display device 10B has a speaker 5 engaging groove 43 for receiving and engaging a speaker 40.

V. Locking Mechanism

A locking mechanism 80 as shown in FIGS. 49 - 53 is located on one of the space-efficient monitors or display devices 10A for locking monitors or display devices 10A to each other and to main CRT monitor 20A or LCD monitor 20B. A lock engaging slot 140 is located on the side of the other monitor or display device 10A, and a lock engaging slot 150 is located in main computer monitor 20A or 20B. A key 120 is inserted into locking mechanism 80 to operate locking mechanism 80.

Referring specifically to FIG. 51, key 120 is illustrated not pushed or inserted into locking mechanism 80 so that key 120 is in the disengaged position. Engaging components 81 and 82 of locking mechanism 80 are in the disengaged position respectively located in slots 130 and 160. Turning now to FIG. 52, key 120 is illustrated inserted and pushed into locking mechanism 80 and in an unturned position. Engaging component 82 is extended from slot 160 and pushed into engaging slot 150 (see FIG. 50) of monitor 20A or 20B, but engaging component 81 is still located in slot 130 and in the disengaged position. Referring now to FIG. 53, the inserted and pushed key 120 is illustrated in a turned and engaged orientation so that engaging component 82 engages in engaging slot 150 and engaging component 81 extends out from slot 160 and into slot 140 (see FIG. 50). FIG. 53 therefore shows that monitors or display devices 10A are locked to each other as well as locked to the main monitor 20A.

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The foregoing description and specifications of preferred embodiments and best modes of the invention known to applicant at the time of filing the application have been presented for the purposes of illustration and description.

5 It is not intended to be exhaustive or to limit the invention to the precise forms disclosed, and obviously many modifications and variations are possible in the light of the above teaching. The embodiments were chosen and described in order to best explain the principles of the

10 invention and its practical application to thereby enable others skilled in the art to best utilize the invention in various embodiments and with various modifications as are suited to the particular use contemplated. It is intended that the scope of the invention be defined by the claims

15 appended hereto.

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CLAIMS

1. Space efficient display apparatus comprising:
electronic apparatus including at least one main component and having a main display or monitor; and
at least one space efficient monitor coupled to the component and moveable between a usable position and a storage position, the at least one space efficient monitor being electrically coupled to the electronic apparatus for displaying selected data in the usable position.
2. Space efficient display apparatus as claimed in claim 1 wherein the electronic apparatus includes one of a computer and a television.
3. Space efficient display apparatus as claimed in claim 1 wherein the at least one main component includes one of a computer main display and a computer tower.
4. Space efficient display apparatus as claimed in claim 3 wherein the at least one main component includes a computer main display and the at least one space efficient monitor is hingedly affixed to a side of the main display for pivotal movement between the usable position and the storage position.
5. Space efficient display apparatus as claimed in claim 3 wherein the at least one main component includes a computer main display and the at least one space efficient monitor includes two space efficient monitors hingedly affixed to opposite vertical sides of the main display for individual pivotal movement between the usable position and the storage position.

6. Space efficient display apparatus as claimed in claim 1 wherein the at least one space efficient monitor is affixed to a side of the main display for sliding movement from the storage position into an intermediate position and then hingedly mounted for pivotal movement between the intermediate position and the usable position.

7. Space efficient display apparatus as claimed in claim 6 wherein the at least one space efficient monitor is further mounted for adjustable height positions relative to the main display.

8. Space efficient display apparatus as claimed in claim 6 wherein the at least one space efficient monitor is further mounted for adjustable pitch positions relative to the main display.

9. Space efficient display apparatus as claimed in claim 1 wherein the at least one space efficient monitor includes a locking system for maintaining the at least one space efficient monitor in the storage position.

10. Space efficient display apparatus as claimed in claim 1 wherein the at least one space efficient monitor is removably coupled to the component.

11. Space efficient display apparatus comprising:
electronic apparatus including at least one main component and having a main display or monitor; and
a pair of space efficient monitors, one each hingedly coupled to opposite sides of the main display and individually pivotally moveable between a usable position and a storage position, the pair of space efficient monitors being electrically coupled to the electronic apparatus for displaying selected data in the usable position.

12. Space efficient display apparatus as claimed in claim 11 wherein the pair of space efficient monitors are hingedly affixed to a side of the main display so as to cover the main display in the storage position and to be positioned adjacent the main display in the usable position.

13. Space efficient display apparatus as claimed in claim 11 wherein the pair of space efficient monitors are affixed to a side of the main display for sliding movement from the storage position into an intermediate position and then hingedly mounted for pivotal movement between the intermediate position and the usable position.

14. Space efficient display apparatus as claimed in claim 13 wherein the pair of space efficient monitors are positioned in juxtaposition to a side of the main display in the storage position and are positioned adjacent the main display in the usable position, whereby the main display can be used while the pair of space efficient monitors are in the storage position.

15. Space efficient display apparatus as claimed in claim 11 wherein the pair of space efficient monitors are further mounted for adjustable height positions relative to the main display.

16. Space efficient display apparatus as claimed in claim 11 wherein the pair of space efficient monitors are further mounted for adjustable pitch positions relative to the main display.

17. Space efficient display apparatus as claimed in claim 11 wherein the pair of space efficient monitors include a locking system for maintaining the pair of space efficient monitors in the storage position.

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18. Space efficient display apparatus as claimed in claim 11 wherein the pair of space efficient monitors are removably coupled to the main display.

19. Space efficient display apparatus comprising:
electronic apparatus including at least one main component and having a main display or monitor; and
at least one space efficient monitor detachably coupled to one side of the main display and moveable between a usable position adjacent the main display and a storage position, the at least one space efficient monitor being electrically coupled to the electronic apparatus for displaying selected data in the usable position.

20. Space efficient display apparatus comprising:
electronic apparatus including at least one main component and having a main display or monitor; and
a pair of space efficient monitors, one each detachably coupled to opposite sides of the main display and individually moveable between a usable position adjacent the main display and a storage position, the pair of space efficient monitors being electrically coupled to the electronic apparatus for displaying selected data in the usable position.

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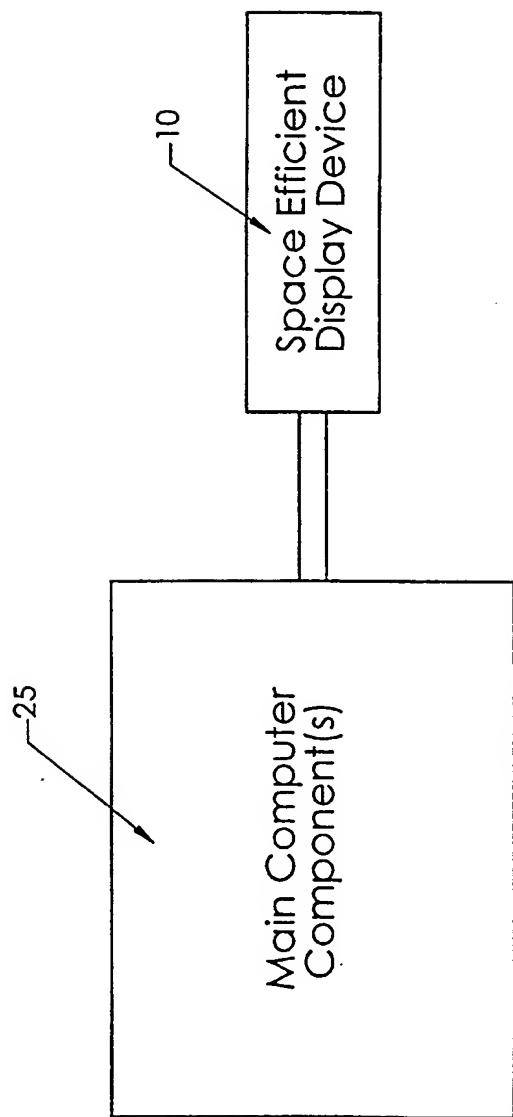


Fig. 1

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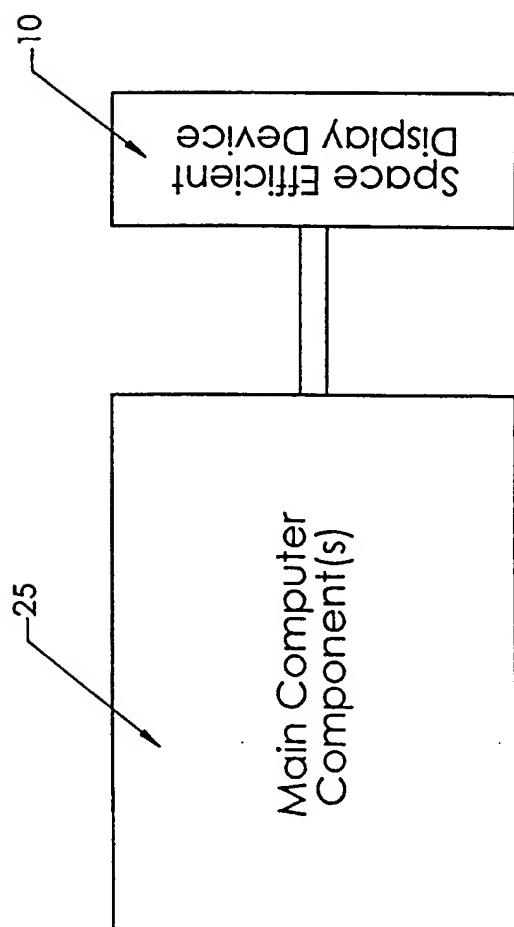


Fig. 2

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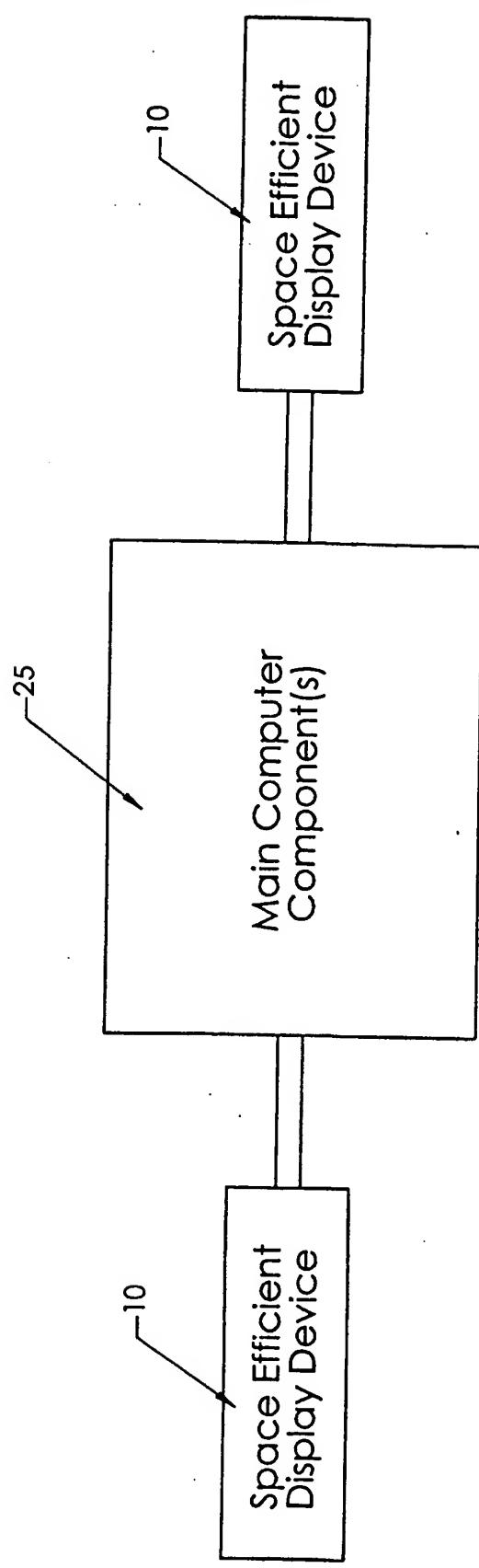


Fig. 3

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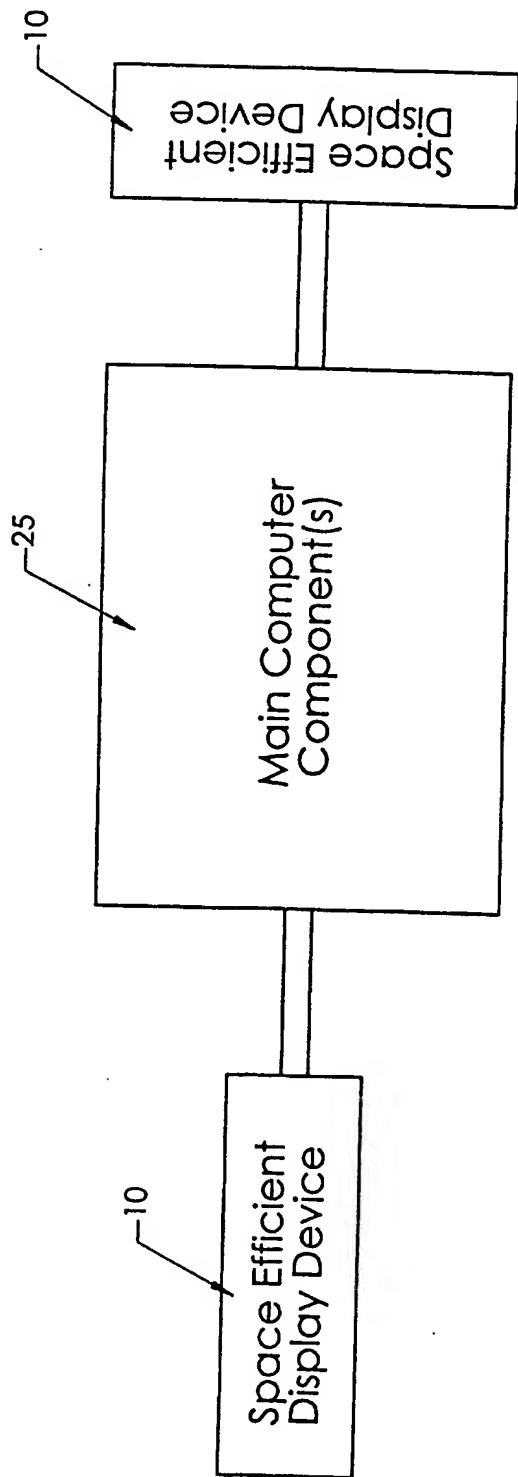


Fig. 4

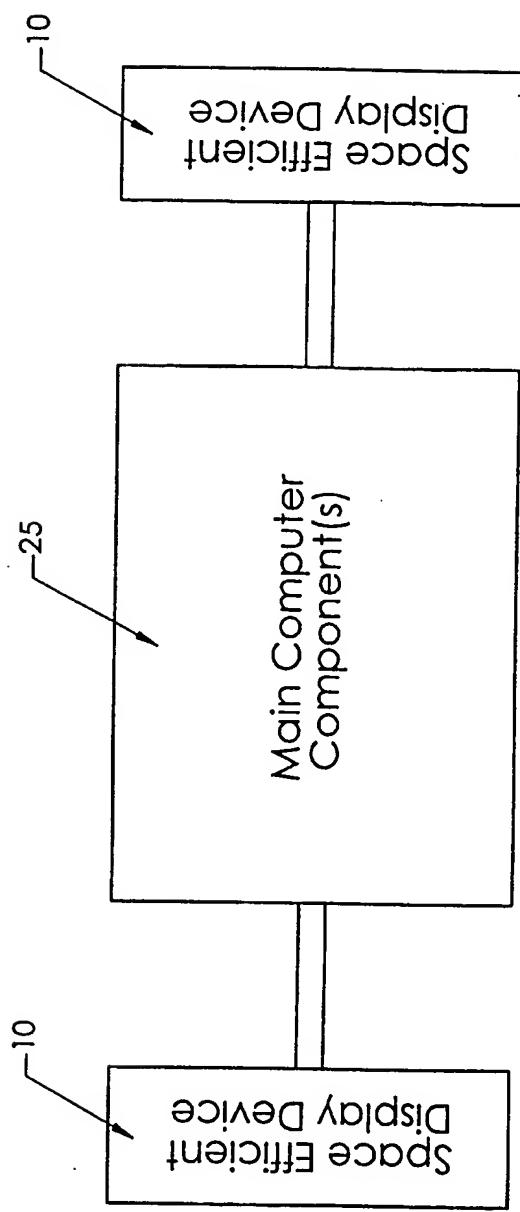
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Fig. 5

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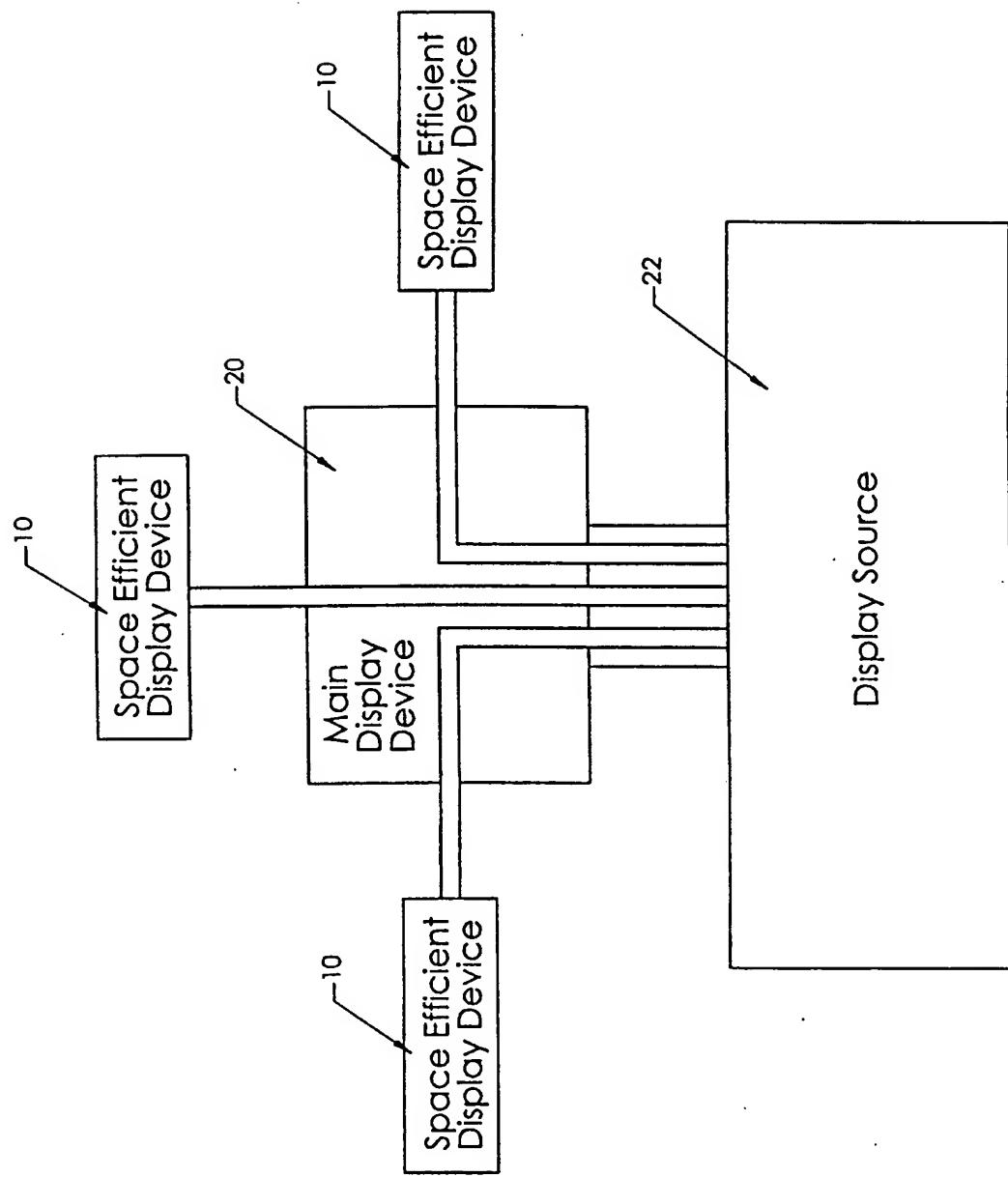


Fig. 6

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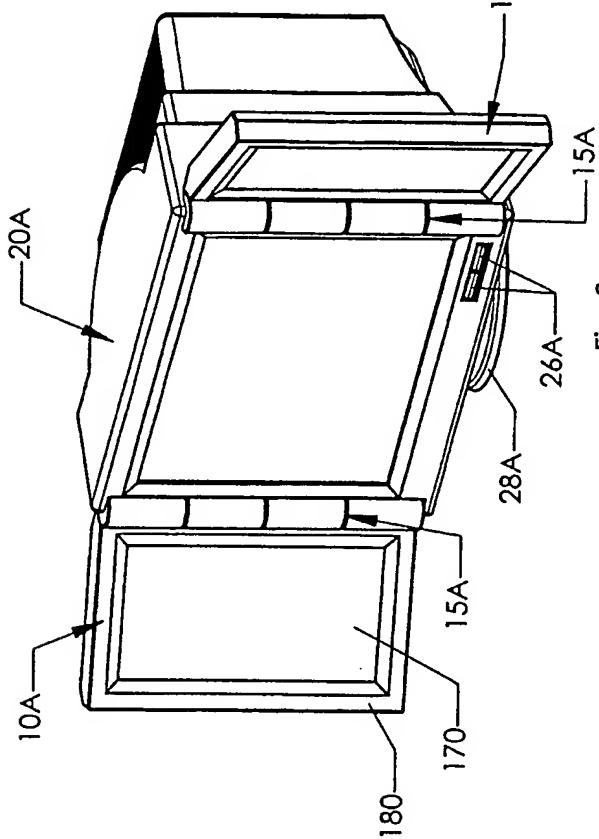


Fig. 8

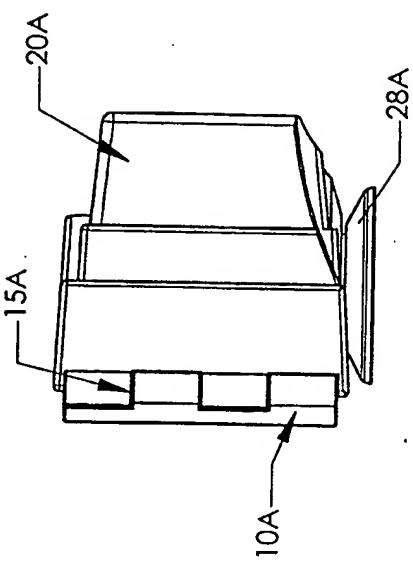


Fig. 10

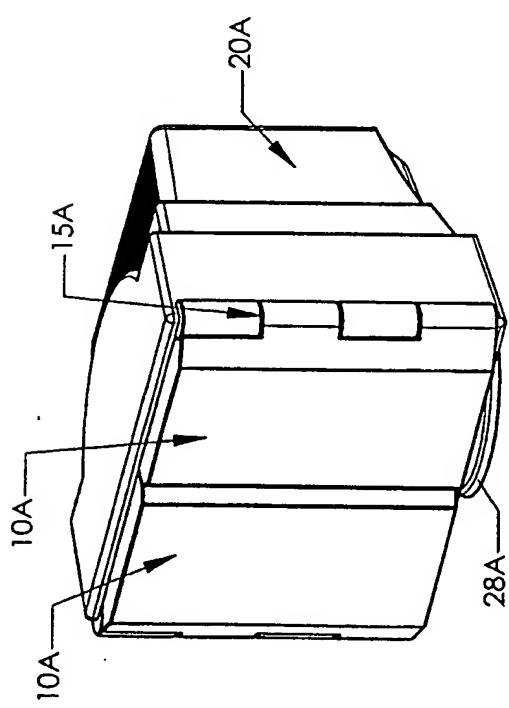


Fig. 7

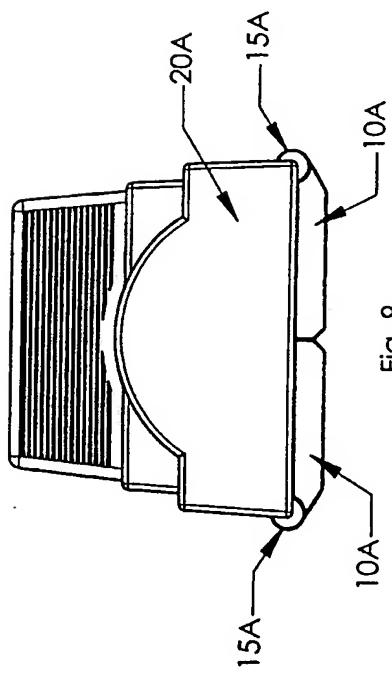


Fig. 9

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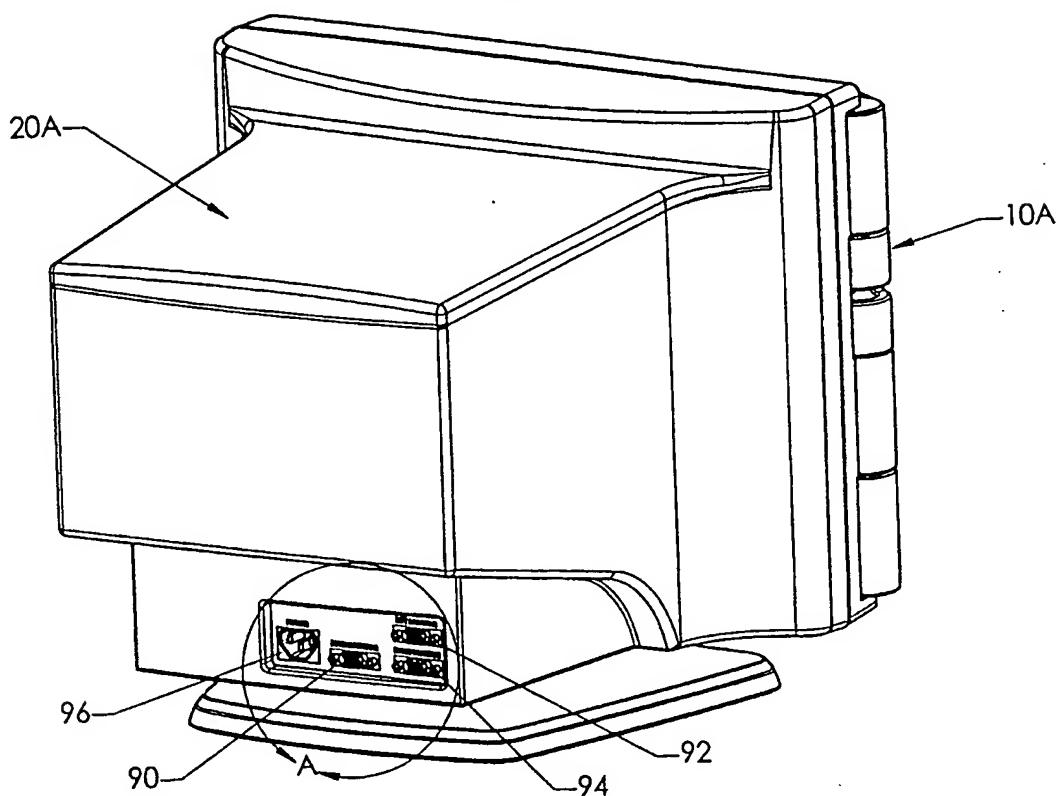
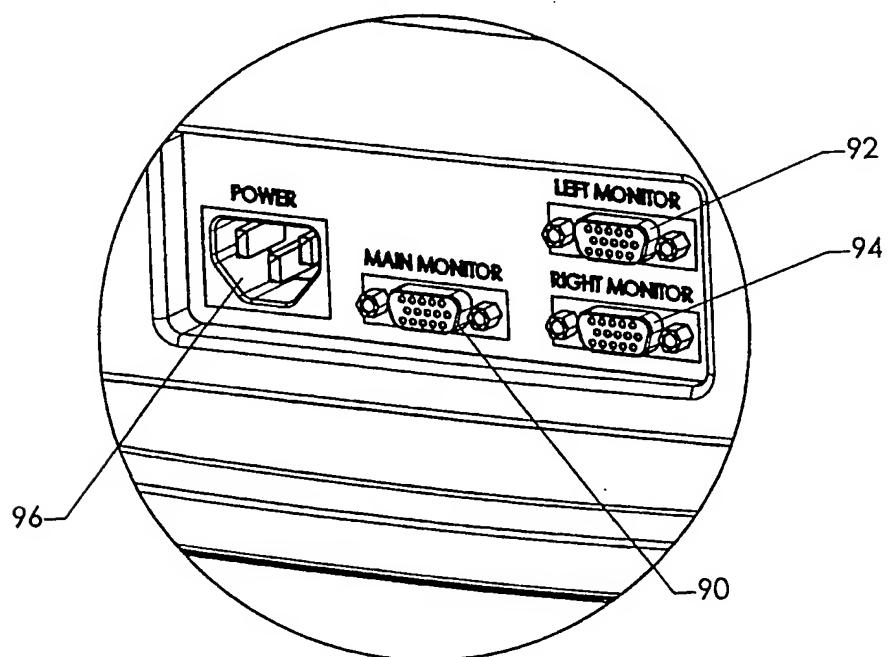


Fig. 11

DETAIL A
Fig. 12

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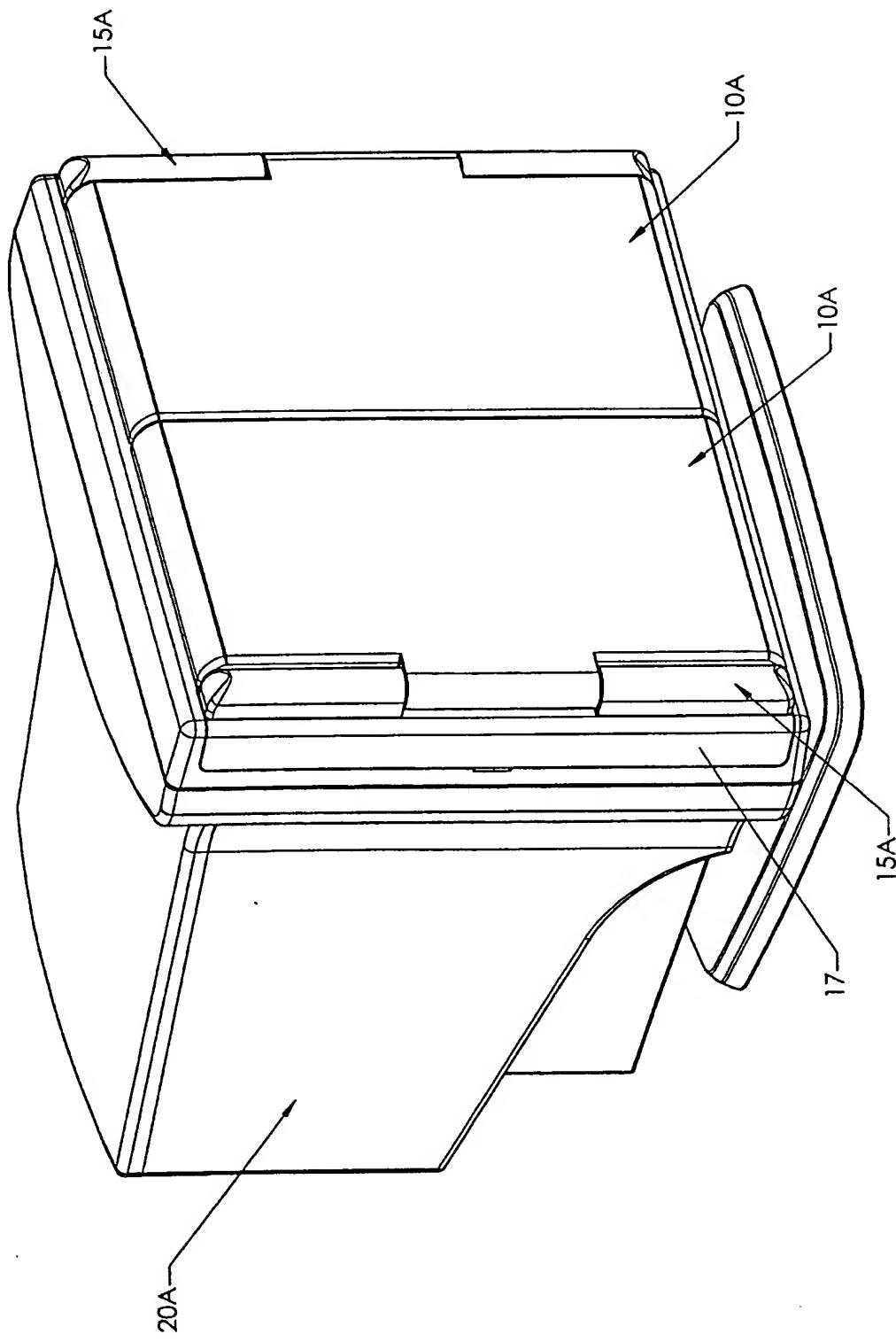
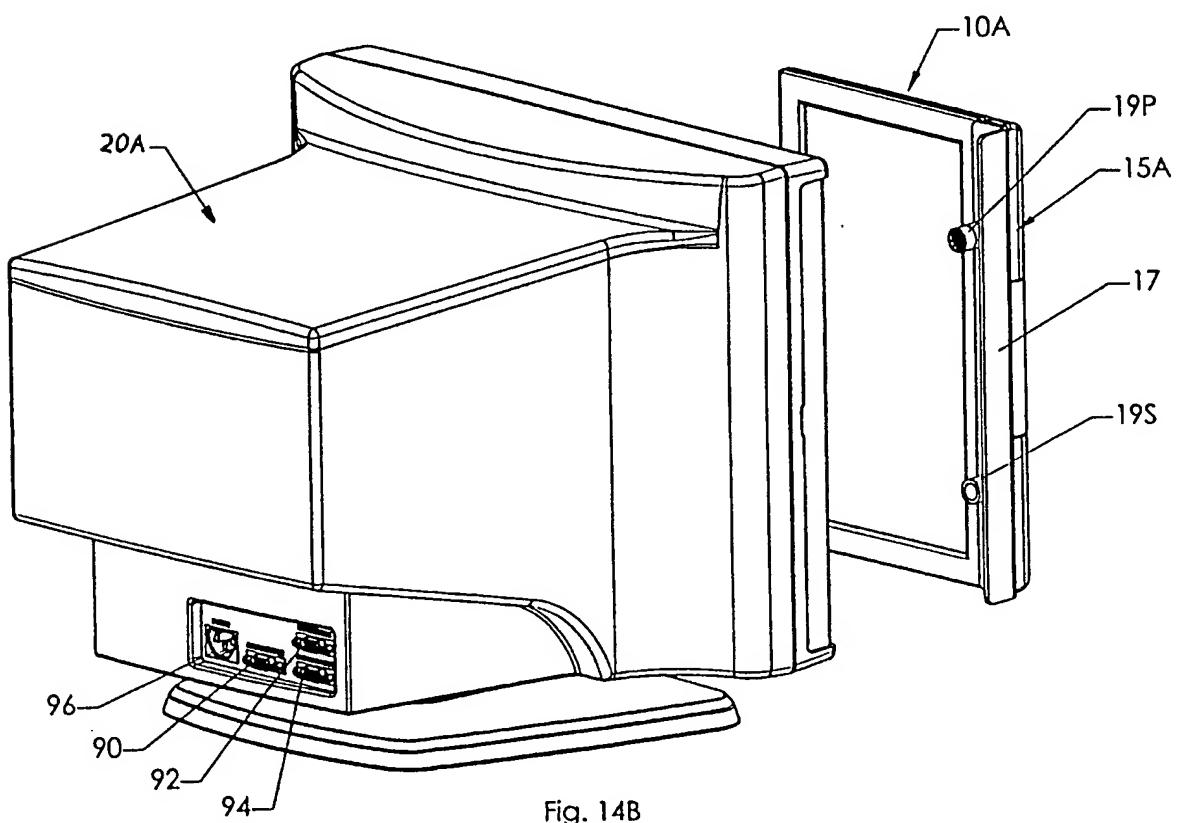
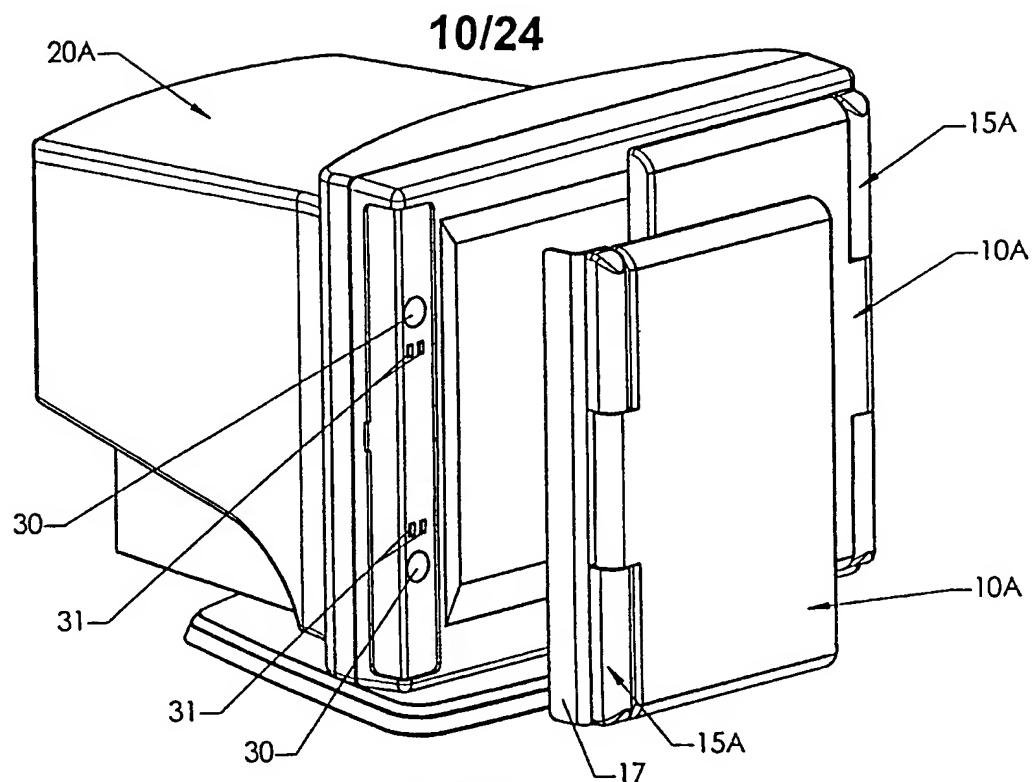


Fig. 13

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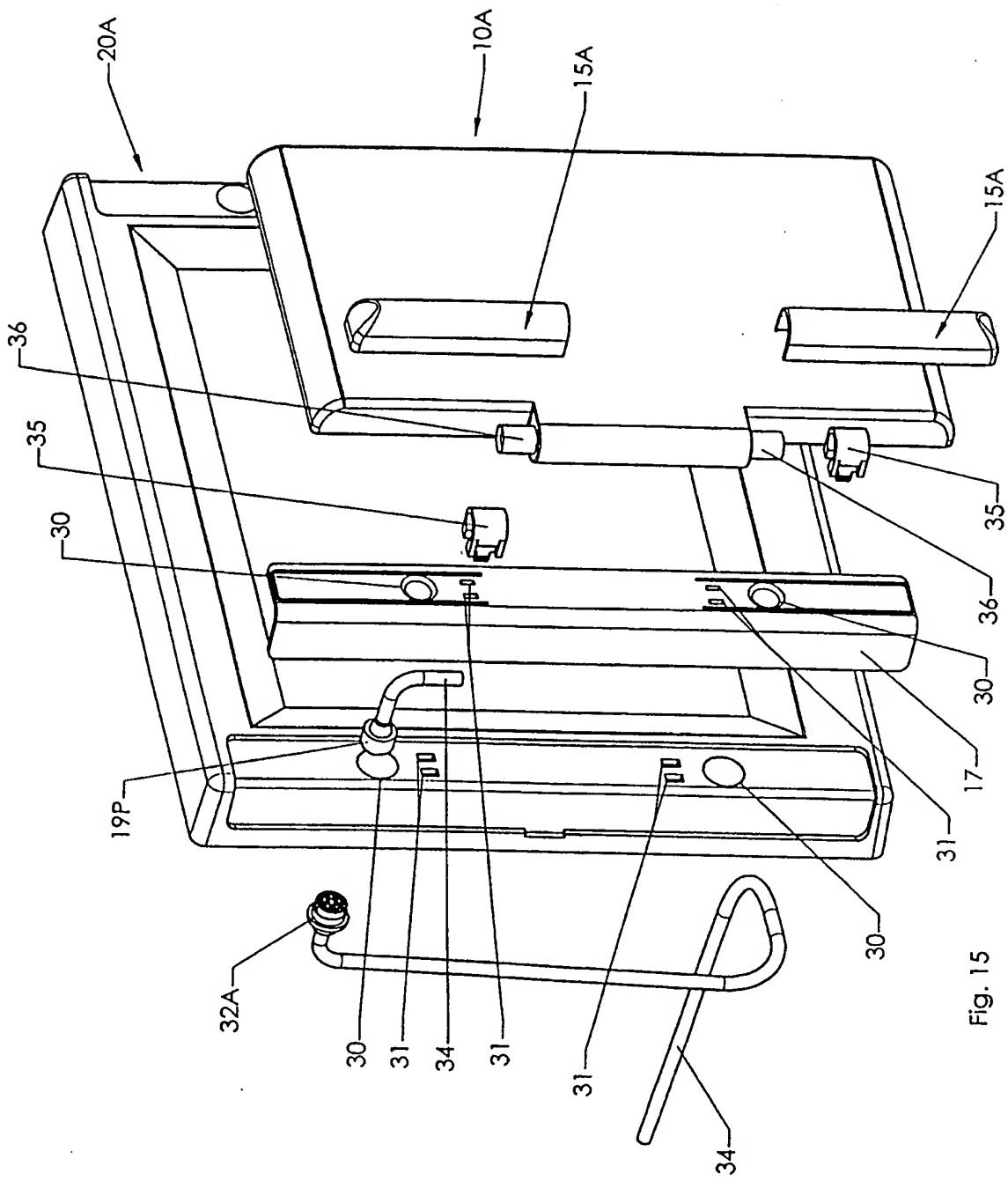
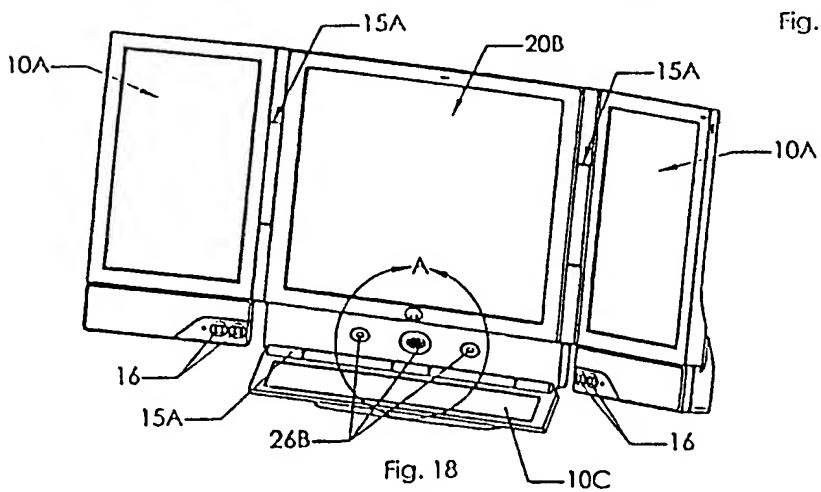
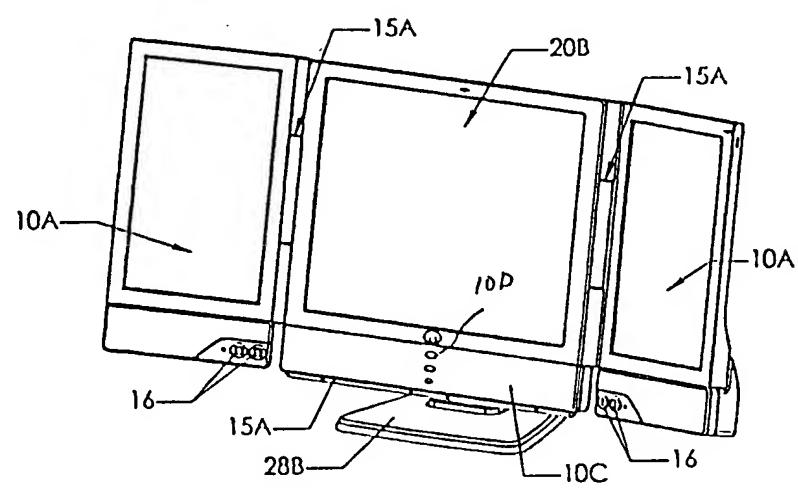
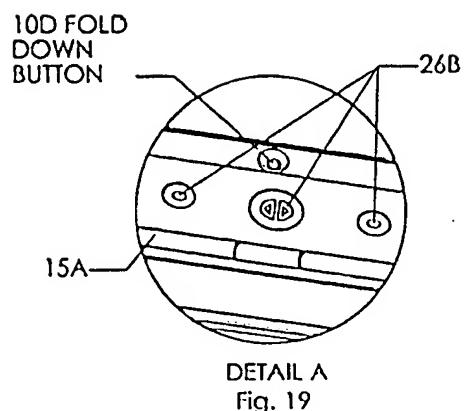
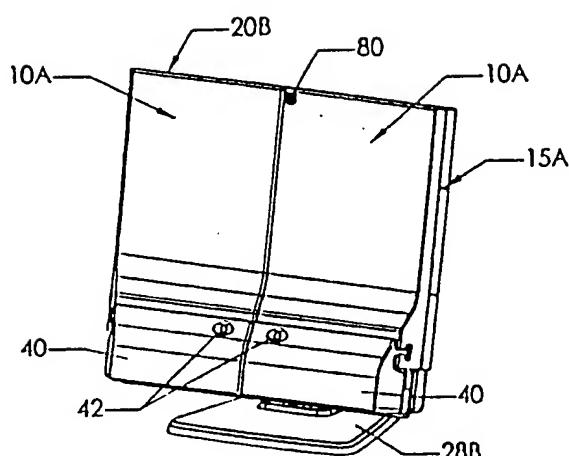
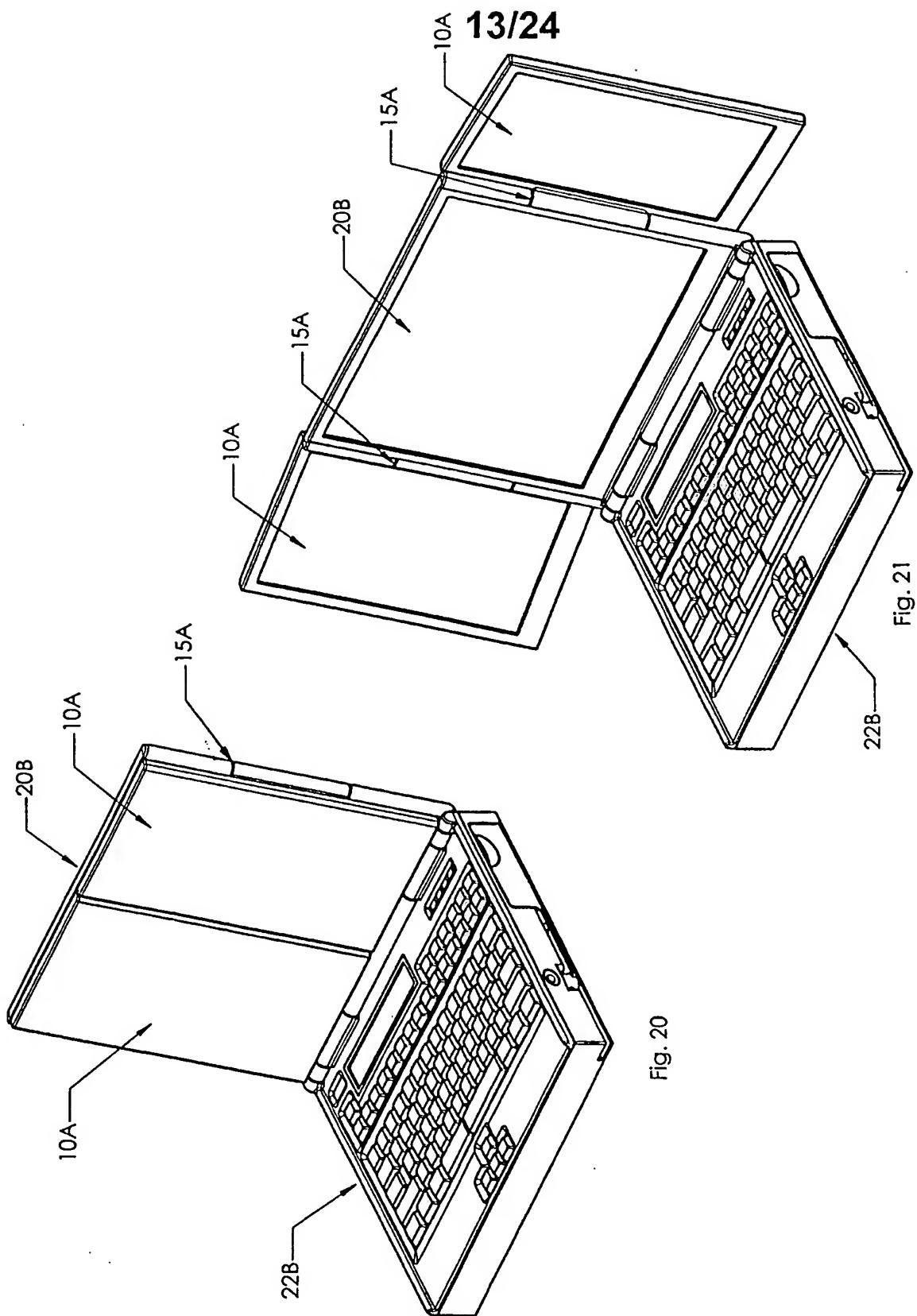


Fig. 15

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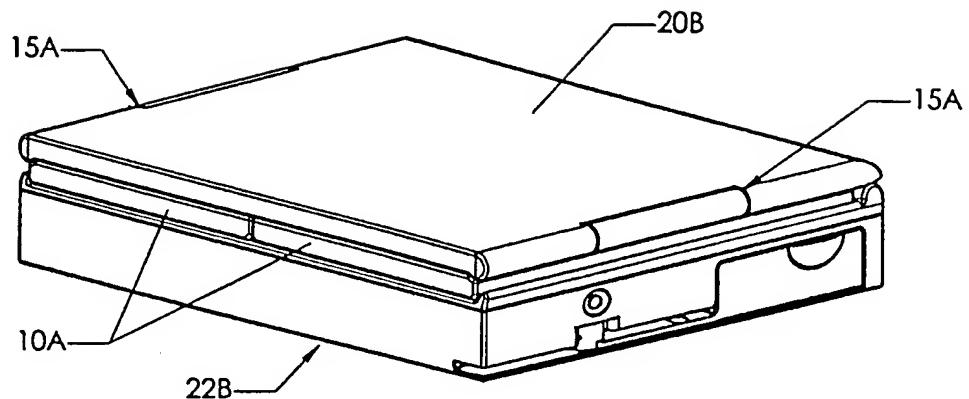
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Fig. 22

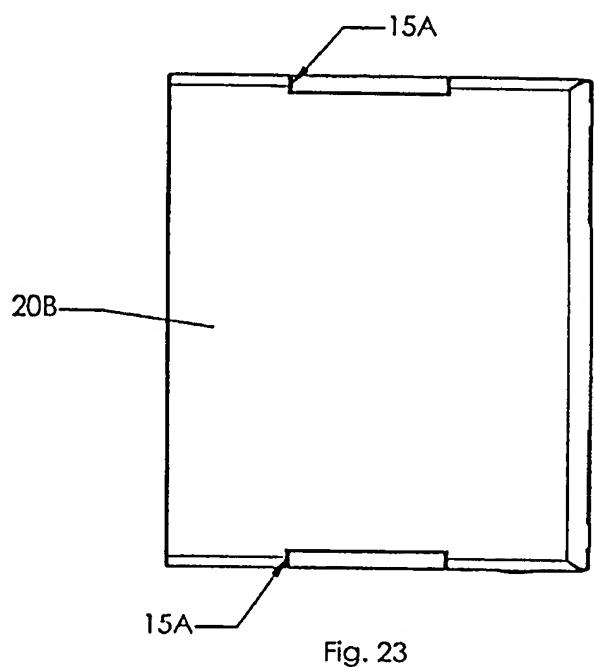


Fig. 23

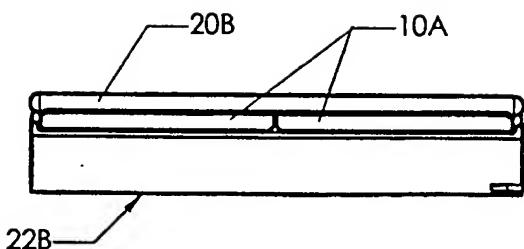


Fig. 24

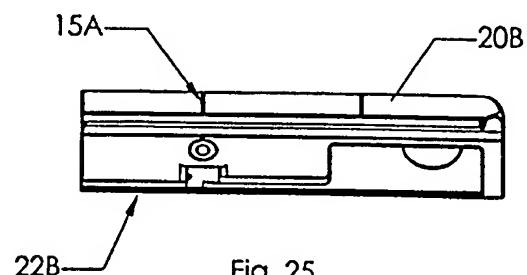
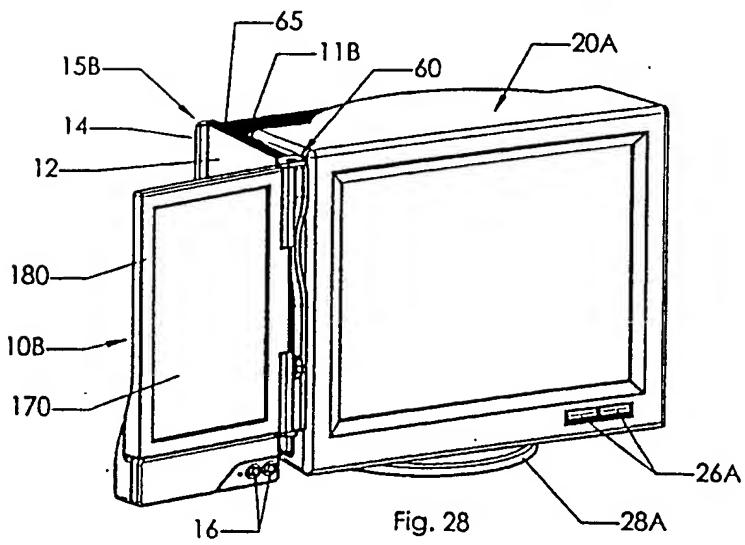
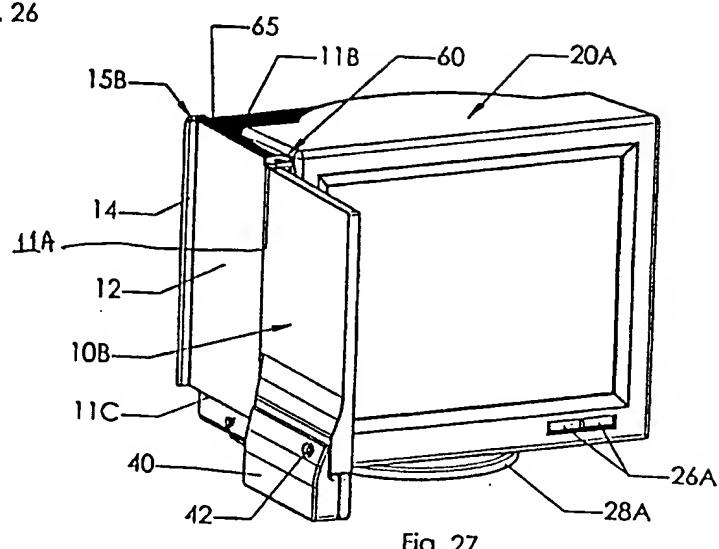
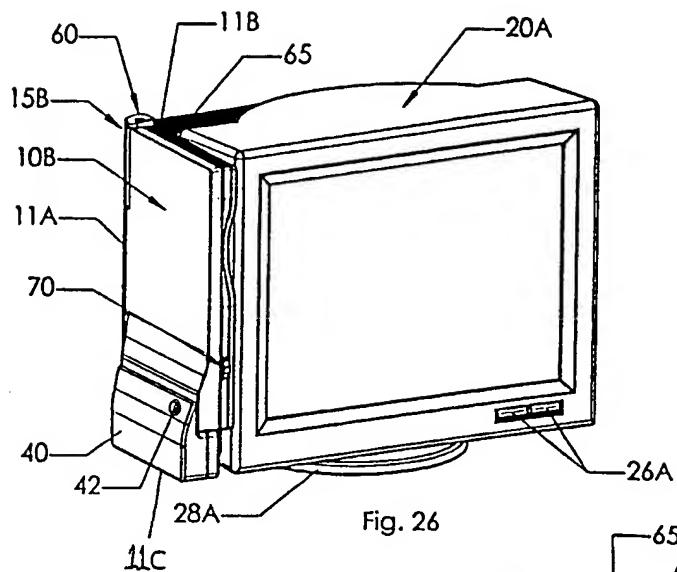


Fig. 25

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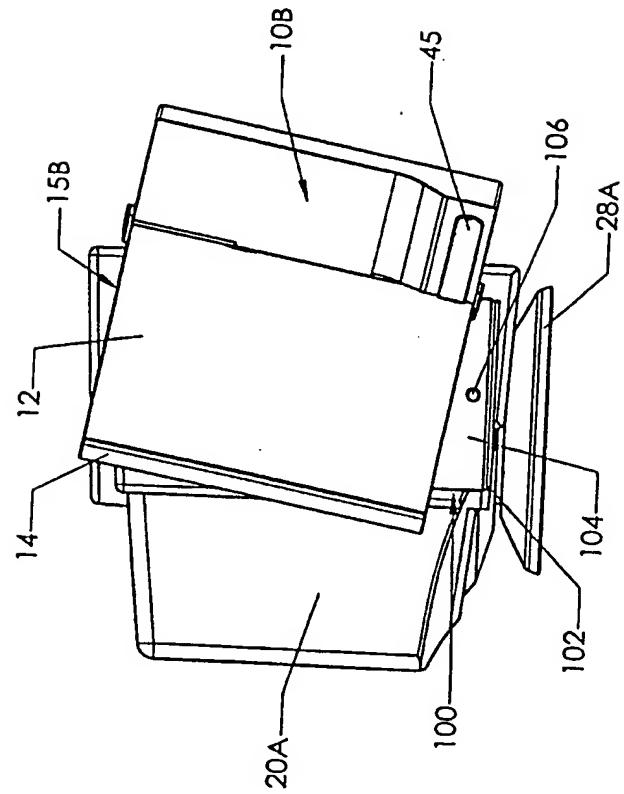


Fig. 30

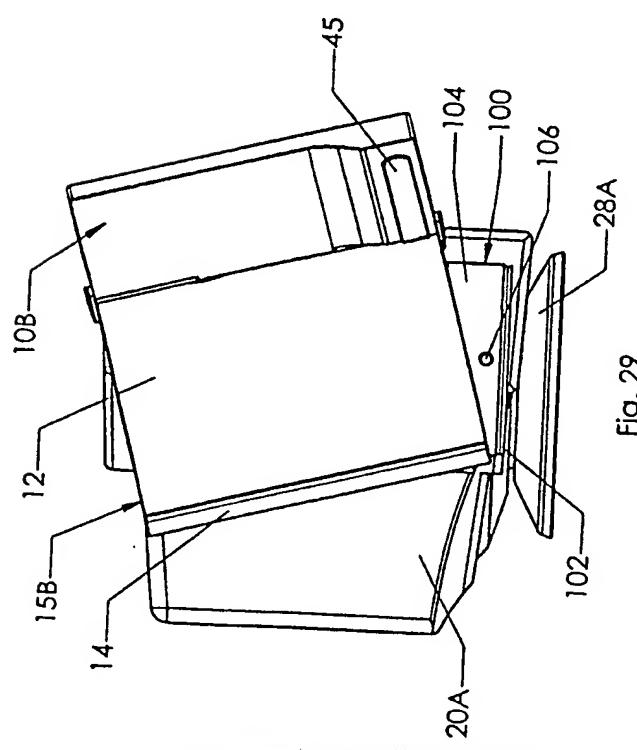


Fig. 29

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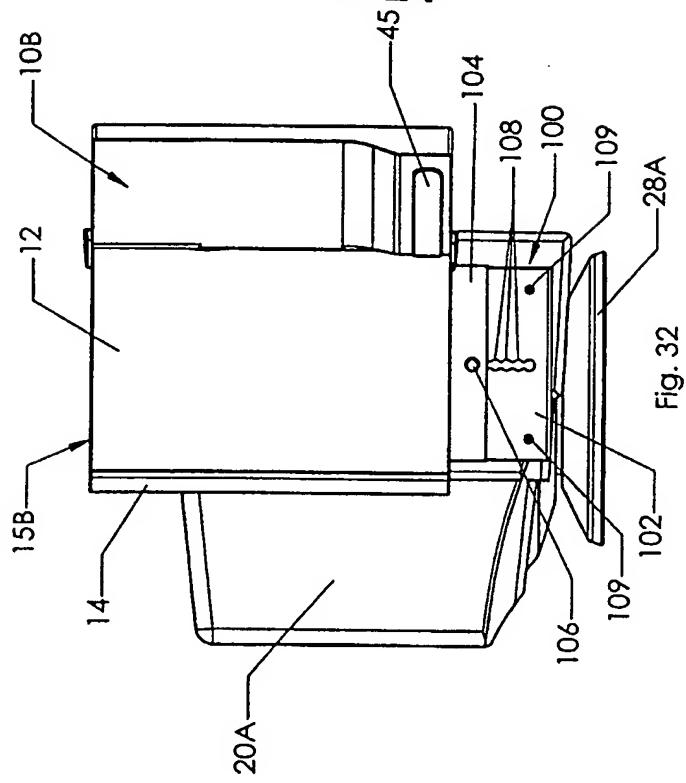
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Fig. 32

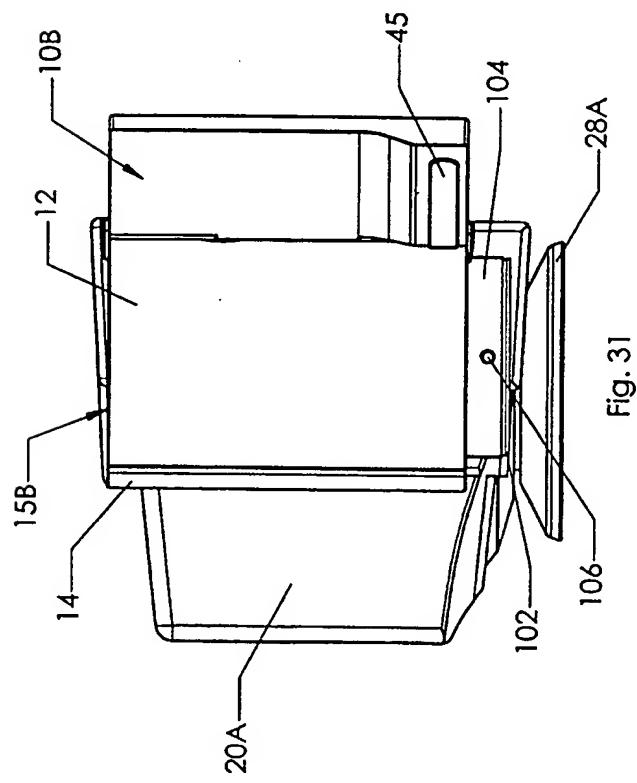
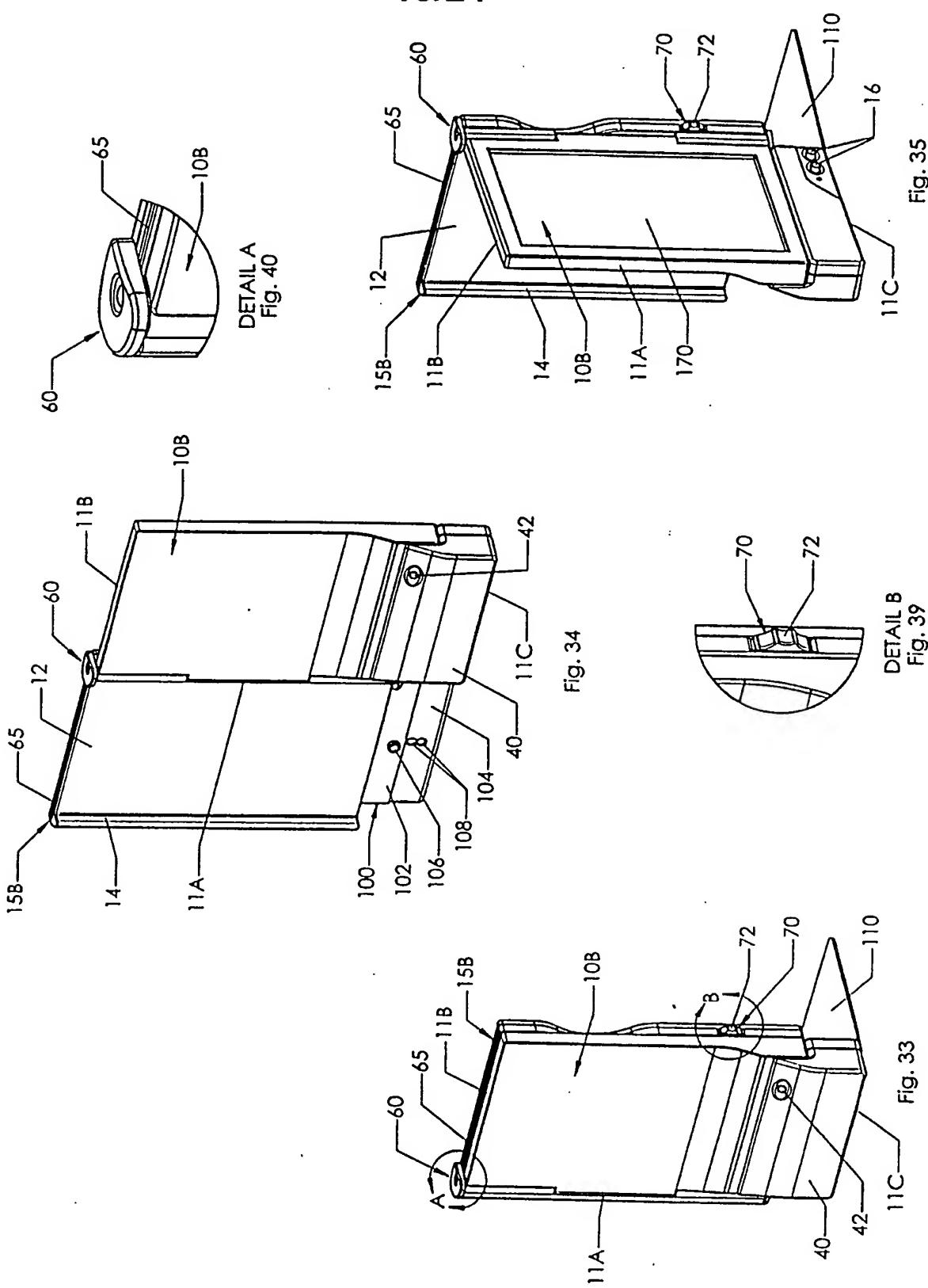
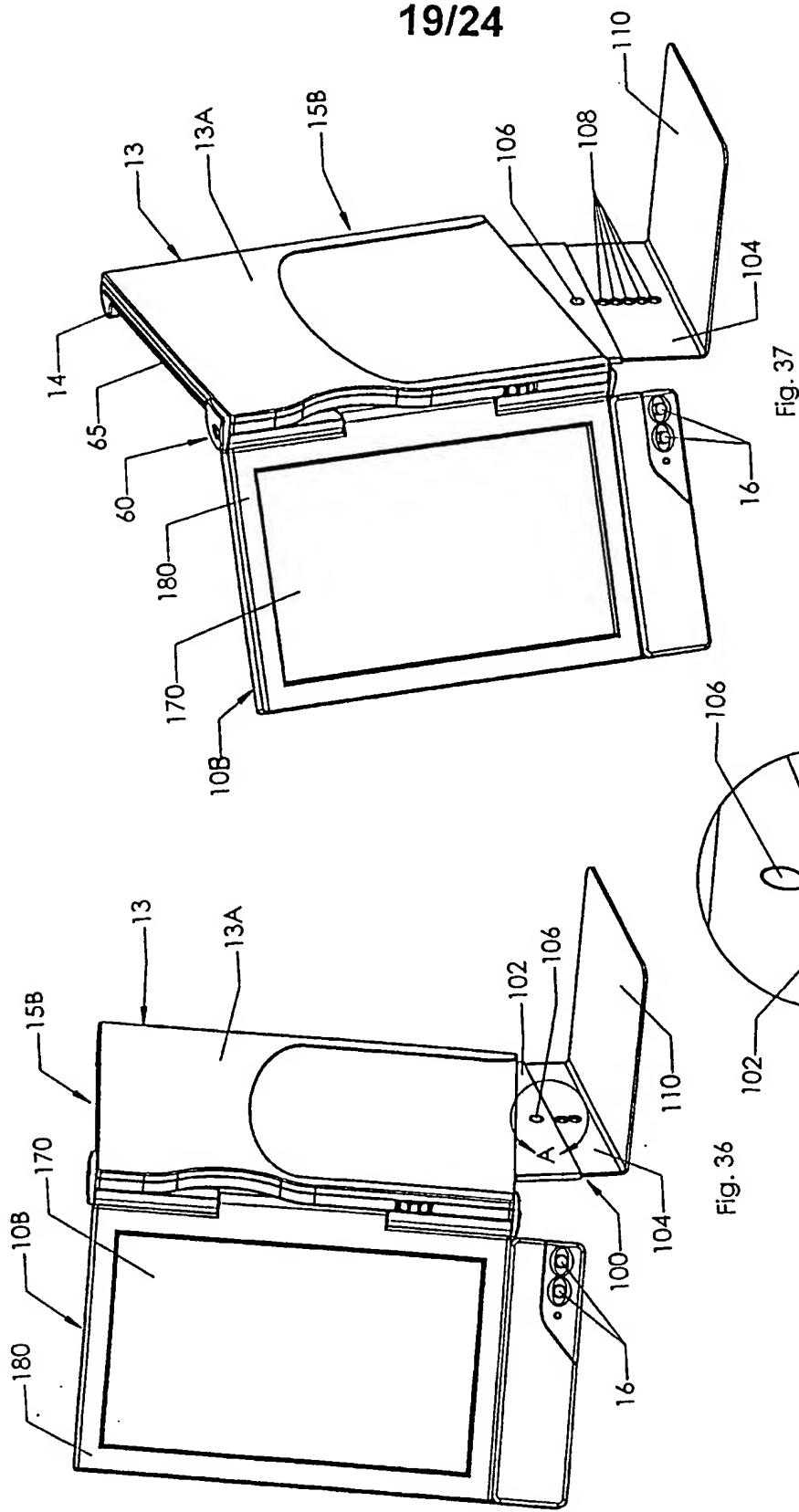


Fig. 31

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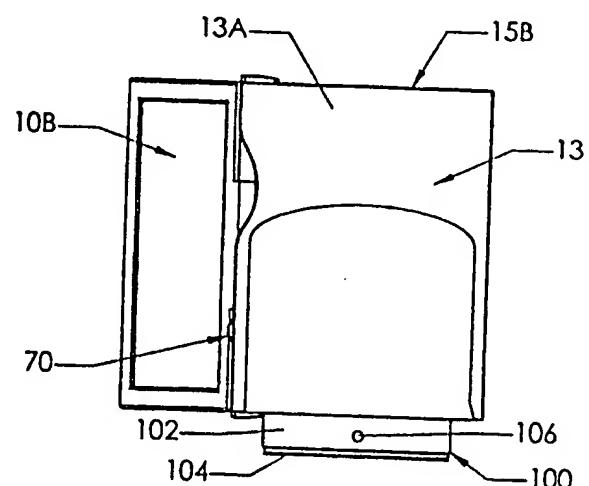
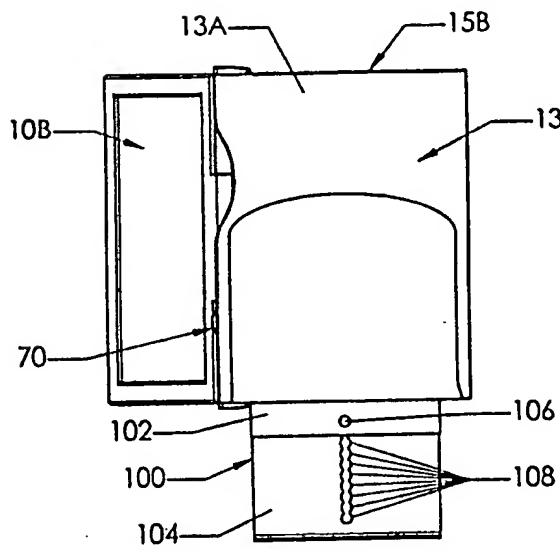
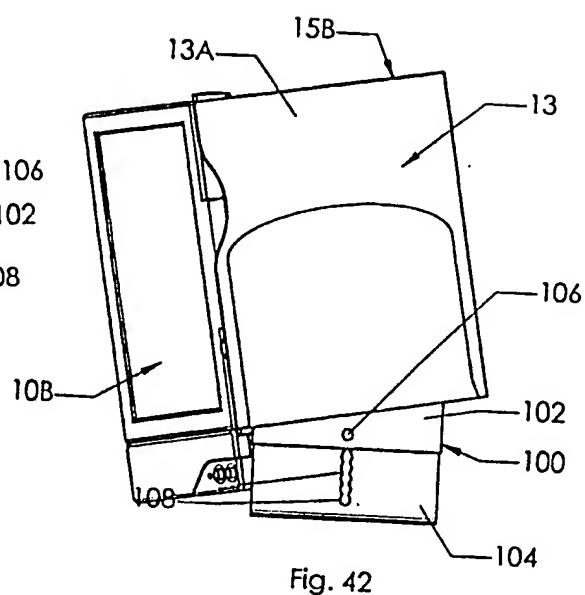
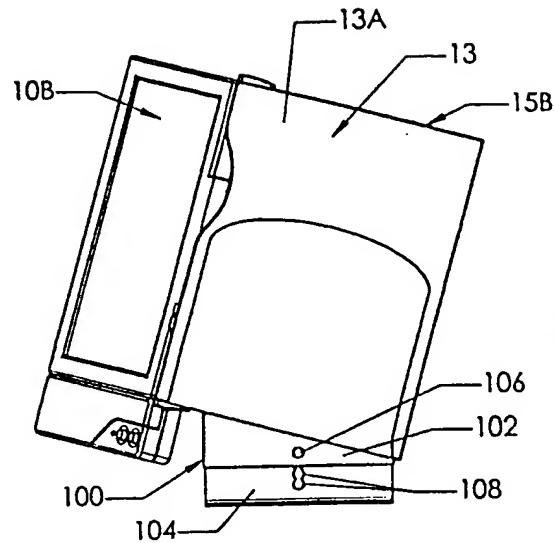


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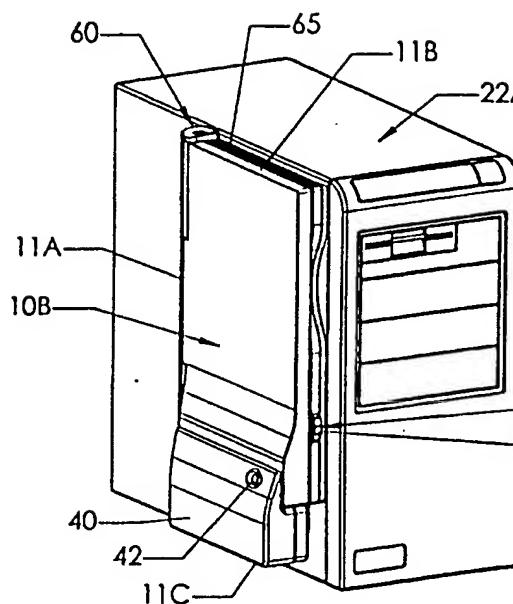


Fig. 45

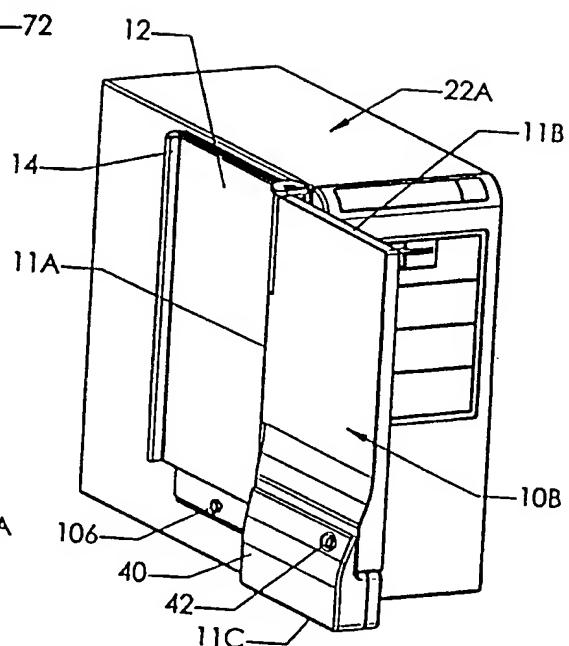


Fig. 46

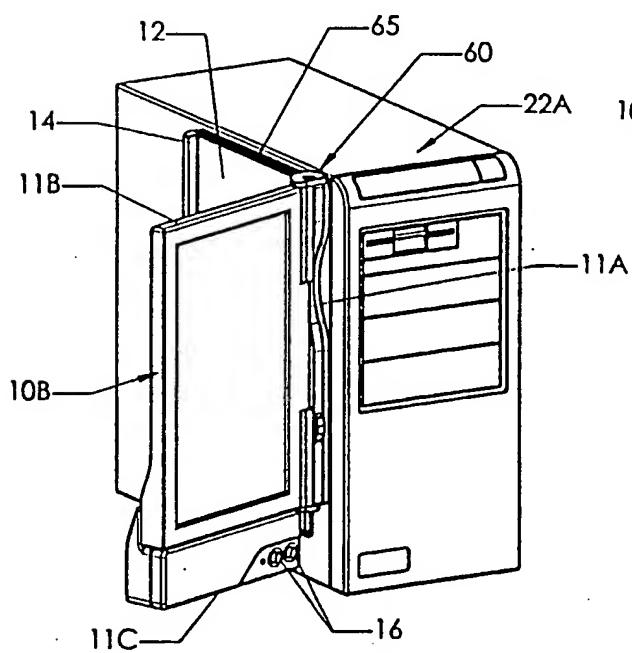


Fig. 47

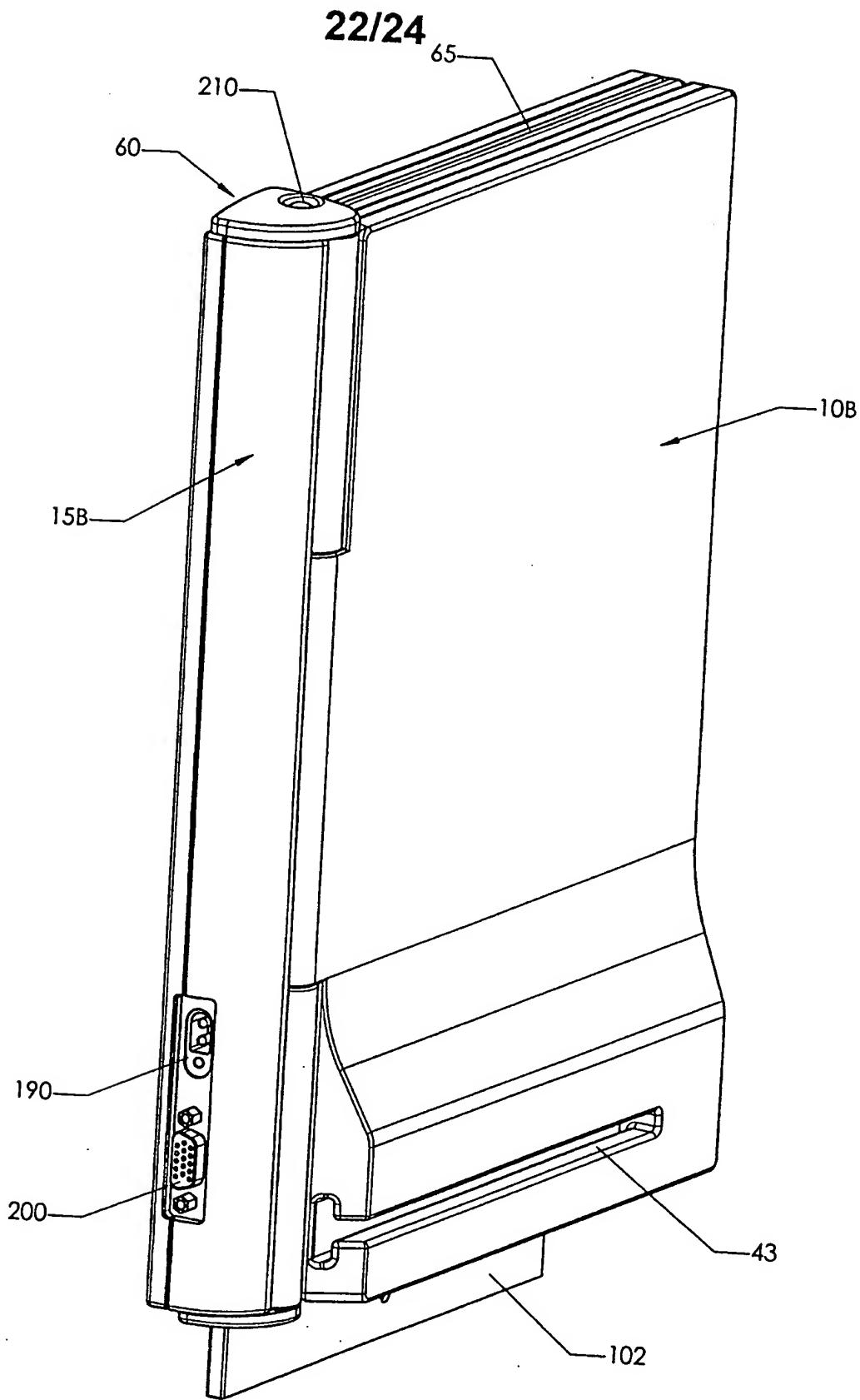


Fig. 48

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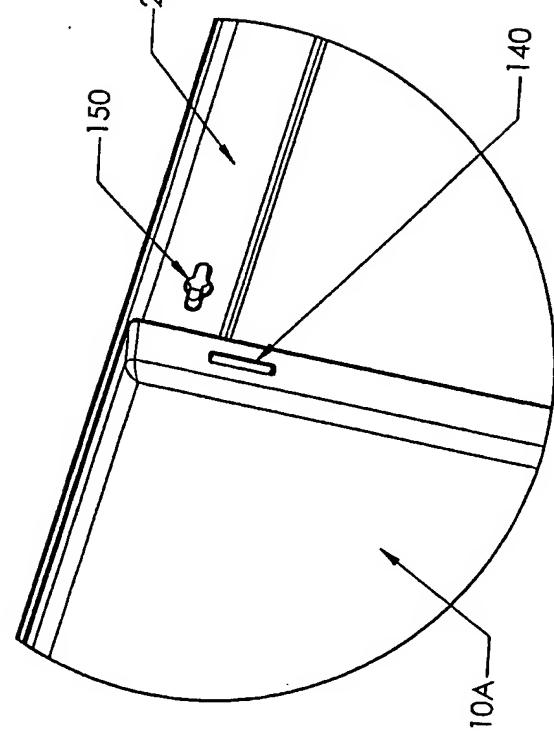
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Fig. 50

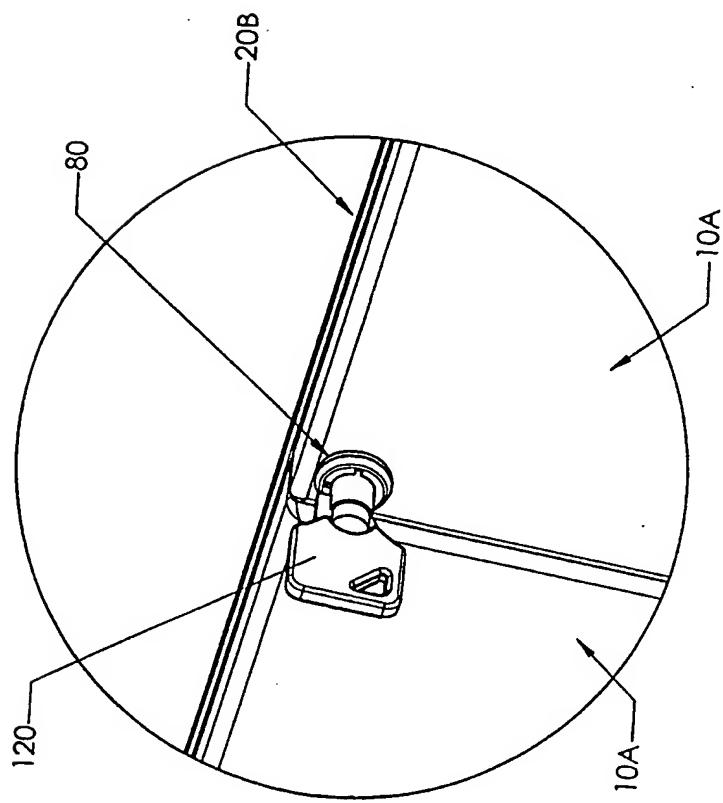
20B

Fig. 49

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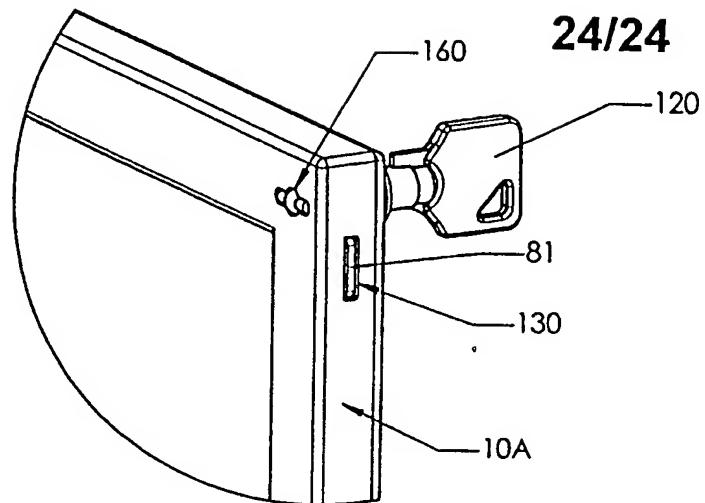


Fig. 51

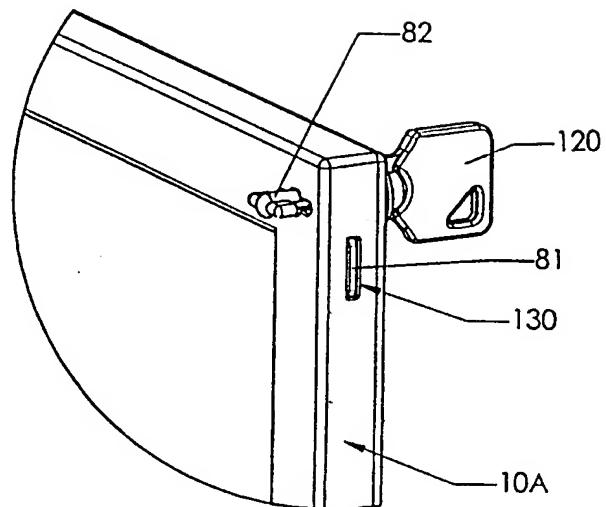


Fig. 52

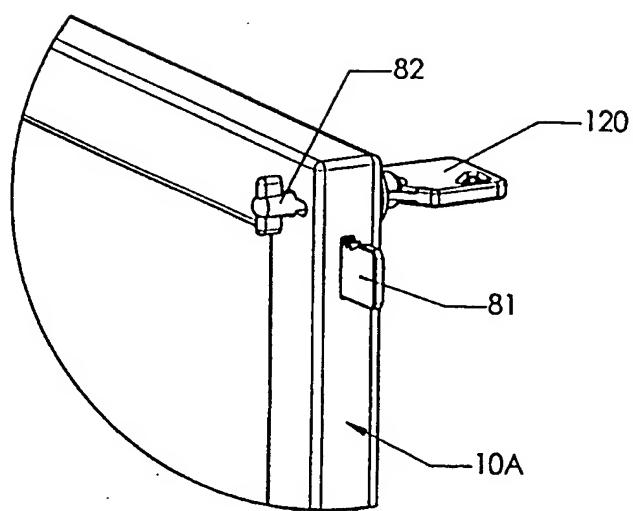


Fig. 53

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INTERNATIONAL SEARCH REPORT

International application No.
PCT/US99/07354

A. CLASSIFICATION OF SUBJECT MATTER

IPC(6) :G09G 3/02

US CL : 345/01

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

U.S. : 345/1, 901, 903, 905; 361/679, 681, 686

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

NONE

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

APS: DISPLAY DEVICE, MULTIPLE MONITORS, WORKSTATION#, HINGE?, MOVABLE, SPACE EFFICIENT;

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	US 5,673,170 A (REGISTER) 30 September 1997, See column 2, lines 2-54; FIG. 1.	1-4
---		-----
Y		5 - 20
Y	US 5,537,127 A (JINGU) 16 JULY 1996, See column 7, lines 34-68; column 8, lines 1-23; FIG. 8.	5-20

 Further documents are listed in the continuation of Box C. See patent family annex.

• Special categories of cited documents:	"T"	later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention
A document defining the general state of the art which is not considered to be of particular relevance		
E earlier document published on or after the international filing date	"X"	document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone
L document which may throw doubt on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)	"Y"	document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art
U document referring to an oral disclosure, use, exhibition or other means	"&"	document member of the same patent family
P document published prior to the international filing date but later than the priority date claimed		

Date of the actual completion of the international search

17 JUNE 1999

Date of mailing of the international search report

19 AUG 1999

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Facsimile No. (703) 305-3230

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